Nature Magazine

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AUGUST-SEPTEMBER 1940

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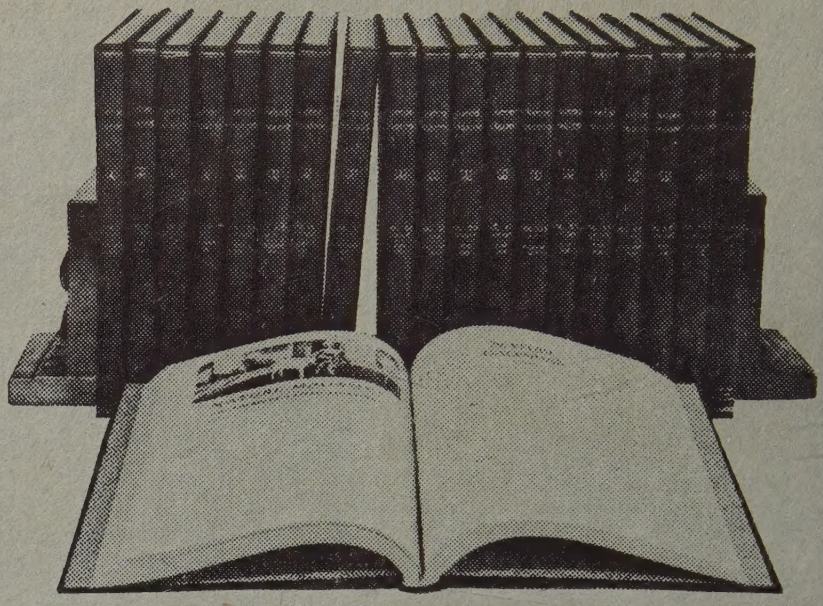

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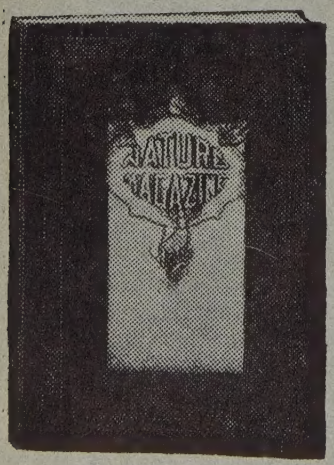

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A Rare Fish

One of the speed champions of the deep is *Acrotus willoughbyi,* one of the world's rarest fishes. The fifth specimen of its kind known to have been caught has been acquired by the American Museum of Natural History in New York. It was taken on rod and reel at Monterey, California, and is five feet four inches long and weighs seventy pounds. *Acrotus* has no ventral, or balancing fins, and from this derives its generic name, which comes from the Greek and means "without oars". Also, the fish lacks scales and is streamlined. From the shape of its tail it is thought to be a distant relative of the mackerel-like fishes, but it has no known near relative. Dr. John T. Nichols, Curator of Fishes, hopes, with this specimen, to be able to place this fish more closely in its proper place in the scale of fish evolution.

Parish Wildlife Refuge

Lake Tekakwitha Wildlife Refuge is only nine acres with a little artificial lake, but it is a startling proof of what can be done with a small area and the will to attract and protect wildlife. At Rollingstone, Minnesota, Holy Trinity Church is fortunate in having as its pastor the Rev. Peter A. Tibesar, a conservationist. In 1930 he started this sanctuary with a few mallard ducks and two Virginia deer as virtually the only local wildlife. Because he regarded Catherine Tekakwitha, the "Lily of the Mohawks" as the "Saint of the Wildwood", he gave her name to the refuge. Today an amazing variety of migratory waterfowl stop there during migration, and other birds and mammals find sanctuary on these few parish acres. They have become a field classroom for students, a lure to naturalists, and a matter of pride to every resident in the community.

Recreation Congress

The place of recreation in the world as it is today will be the central theme of the 25th National Recreation Congress that meets in Cleveland, Ohio, September 30 to October 4. Professional and volunteer leaders in this field are invited to attend the meetings and share in the discussion of the questions that will be presented.

Wildlife Exhibit

So successful was the first exhibition of wildlife photographs held under the auspices of the New York State Nature Association, that the second annual exhibition will be held at the Albany Institute of History and Art from October 30 to November 10. Prizes will be awarded for the three outstanding pictures submitted for the salon. If you wish further information send a stamped, return envelope to Miss Alice Morgan Wright, 393 State Street, Albany, New York.

Butterflies

Rene Belbenoit, whose escape from Devil's Island in French Guiana was an epic of human endurance, is now living in Costa Rica, where he is making a living by gathering and selling butterfly specimens. His permit to remain in the United States finally ran out and he was forced to leave his American wife behind and seek refuge elsewhere. Anyone interested in butterflies as specimens, or as decoration, may reach him at Apartado 1932, San Jose, Costa Rica.

Had Never Written a Line—Sells Article Before Completing Course

"Before completing the N.I.A. course, I sold a feature to Screenland Magazine for $50. That resulted in an immediate assignment to do another for the same magazine. After gaining confidence with successive feature stories, I am now working into the fiction field. Previous to enrolling in the N.I.A. I had never written a line for publication, nor seriously expected to do so." —Gene E. Levant, Broadmoor Hotel, San Francisco, Calif.

How do you know you *can't* write?

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If the latter course is the one of your choosing, you probably *never will write.* Lawyers must be law clerks. Doctors must be internes. Engineers must be draftsmen. We all know that, in our times, the egg does come before the chicken.

It is seldom that anyone becomes a writer until he (or she) has been writing for some time. That is why so many authors and writers spring up out of the newspaper business. The day-to-day necessity of writing—of gathering material about which to write—develops their talent, their insight, their background and their confidence as nothing else could.

That is why the Newspaper Institute of America bases its writing instruction on journalism—continuous writing—the training that has produced so many successful authors.

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Many people who should be writing become awe-struck by fabulous stories about millionaire authors and therefore give little thought to the $25, $50 and $100 or more that can often be earned for material that takes little time to write—stories, articles on business, fads, travels, sports, recipes, etc. —things that can easily be turned out in leisure hours, and often on the impulse of the moment.

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Camera Trails

BY NORRIS W. HARKNESS

"THE OTTER POOL", PRIZE-WINNING PICTURE BY FREDERICK KIRKBRIDE OF LOS ANGELES, CALIFORNIA

The Contest Pictures

The entries in our contest have been beyond my expectations both in number and in quality. Several times the judges have felt that it was almost unfair to many of them to pick two as the winners, but not all could win, and the difficulty in awarding the prizes simply added to the honor of the ones selected.

The thing that pleases me especially is the pictorial value of most of the prints. With so many naturalists among the Camera Trailers, it was to be expected that their work would be good from the standpoint of showing "what and how," but it is not easy to combine real informational value with photographic quality and good composition. Despite the problems involved, and the need for the combination of the different kinds of skill, the entries show a most pleasingly high standard of workmanship in every department, and I sincerely congratulate the makers of the prints.

Up to this moment I have received 284 prints from 116 entrants in 33 states and Canada. Of these there were the 14 winners—through this month's contest—and 19 Honorable Mentions. Any one of these 33 pictures should be a source of pride to any photographer.

The winners for this issue are Frederick Kirkbride of Los Angeles with "Otter Pool" (published here), and our old friend, Hugh M. Halliday of Toronto, with "Cecropia Moth," a picture similar to one of the winners in the June-July issue. The Honorable Mentions go to Lawrence D. Hiett of Toledo, Ohio, for his "Grasshopper," and to F. W. Steuwer of Allegan, Michigan, for his "Racoons."

All four of these pictures are excellent in their print quality and in their value as Nature pictures. Mr. Kirkbride and Mr. Steuwer must have spent hours to catch their subjects in such action. My congratulations to them, and also to the makers of the other pictures that could not win.

But let's go back to the January issue and pick out some of the prints that will help us to decide on the best way to go about making Nature pictures in the future.

To begin, there are two types of Nature pictures. One has no purpose except to teach the details of the subject, and, perhaps, show its native habitat. The other stresses the pictorial angle as well, and it is this kind of picture that we, as Nature photographers, try to make. The judges have sought to pick the winners with the thought that photographic excellence comes first. It is the tool with which we express ourselves, and we can no more make good Nature pictures without photographic quality than we can make a good speech without knowing the language.

Given equally good quality in the prints, then, we have tried to rate the Nature value most highly, with human interest, composition, and the uniqueness of the subject matter following in that order. With two prints of equal photographic quality and composition, the subject that offered the greatest difficulties to the photographer was given preference, but, as both Dr. Anthony and Mr. Lootens agreed, the familiar subject, well taken, is better than a poor picture of the most unusual bird or beast.

It is this difference in the ease with which subjects may be posed that made it difficult for pictures of plants and flowers to compete with more active subjects, and caused us to decide to limit the November contest to flora. All other remaining months will be open for any subjects, but that one month will be confined to plants and flowers. The judging will take place on September 15, so hurry your entries to me at 320 East 42nd Street, New York City. Pictures that belong in this class, but which have already been submitted, will be reentered for the November contest. Good luck to every one of you.

But, to the pictures. The January winners varied in their main effect. Mr. Crumb's shot excelled in human interest, while Mr. Haak's kingfisher is better as a Nature study. Unfortunately, despite the care of the engraver in making the reproductions, there is always a real loss in printing pictures, and in many cases the reproduction is not nearly as good as the original. Other entrants in this month were good, but lacked either print quality or the sense of timing that makes a Nature shot interesting.

In February, Mr. Scheffer's Arctic fox pup was especially good, and Mr. Millar's dove was tops photographically. The runners-up might well have received prizes, too, and it was one of the most difficult months for the judges.

March was one real triumph for the human interest type of picture with Mr. Halliday's chickadee. It is the kind of picture we all try occasionally, but this time it was carried through perfectly. Unfortunately, Mr. Winn's cicada lost in reproduction. In the original, every detail of the wings and the pupa case are clearly shown, and at the same time the arrangement of the material in the picture area and the general quality of it all made it outstanding.

Mr. Sheldon has an exceptional shot in his "Esprit des Bois" in April. After it had been selected by the judges, it was discovered that it had won another prize for him in another contest. Mr. Halliday won, too, with a good shot of a bird family at feeding time. Many such pictures have been submitted, but this is one of the best the judges had seen. Mr. Gray's lizards were most unusual, but both this shot and Mr. Stroh's salamander were felt to be less well photographed.

Owl pictures are another species that arrives regularly, but Mr. Pratt's screech owl staring out of the hole in the tree is more exciting than most of them and has fine quality. Mr. Gray's robber fly is better than the reproduction shows it and would make a good example for any Nature class, in addition to being a good picture. In that same May contest, Mr. Rattenbury's gull shot is splendidly timed and shows thought and perfect arrangement.

In June Mr. Sims won with the photographic quality of his cecropia moth—as did Mr. Halliday this month. Most moth and butterfly pictures are below standard photographically—the chief cause of trouble is a too shallow depth of field with a resultant loss of detail in the nearer or farther parts—but these two are fine. M. Stophlet's bittern is another of the patient, skillful pictures that delights the judges' hearts from any angle.

This is not a very exhaustive criticism of the pictures you have sent to me, but the editor seems to want to use some of the magazine for other things, so it is not possible to mention many fine pieces of work or express my feelings on any of them as completely as I would like. I hope your looking over the winners will give you an idea of what the authorities—Dr. Anthony and Mr. Lootens, and others who know Nature pictures—are looking for in such a contest.

Remember the flora contest in November and its closing date of September 15. Remember too that the 1940 contest comes to an end with the December issue and that pictures reaching me after the judging in the middle of October cannot be entered. Also, I cannot undertake to return prints that arrive after that judging.

Winners of each monthly contest have their choice of any of the following books,

n addition to a chance at the grand prize of a $25 merchandise award from Willoughby's, 110 West 32nd Street, New York City:

Photo Lab Index by Henry M. Lester; *Photography Around the Year* by Percy A. Morris; *New Ways in Photography,* or *Finding New Subjects for Your Camera,* both by Jacob Deschin; *Eyes in the Night* by Tapban Gregory; *The Fun of Photography* by Mabel and Mario Scacheri; or *Photography* by Dr. C. E. K. Mees.

You want every one of these books in your library, and you might be able to use another twenty-five dollars' worth of equipment or material, so get your entries to me at 320 East 42nd Street, New York City, at once.

This and That

Burke and James, Inc. have added several attachments to the Solar Enlarger that has been mentioned here before, and, in addition, have added two larger sizes to the Solar line. If you are thinking of an enlarger, or did not get their booklet on enlarging, write to them at 223 West Madison Street, Chicago.

If you make movies, you know the importance of a careful editing job to change your work from so many feet of film to a story. Bell and Howell of 1801 Larchmont Avenue, Chicago, have announced the Filmotion Editor for 8 or 16mm film. The editor is a viewer that shows actual movies on a small glass screen and makes the inspection and selection of sequences fast and simple. Write to the above company for full information—and do not forget to mention Camera Trails. Better check on the new Filmo Fader, too.

Fink-Roselieve Company, Inc., of 109 West 44th Street, New York City, have a new stainless steel thermometer made especially for tanks and priced at one dollar. If your dealer cannot supply you, write to them for information on their line of chemicals and equipment.

The Spring Issue of *Filmo Topics,* Bell and Howell magazine, has an article by Richard L. Bishop on the flight of ducks and other wild birds. If you have only watched birds in action, you have never really seen what they do, and you will not until you see a high speed movie of what happens. Which brings up a question. Would you Camera Trailers like to have more movie material in these columns, and if so, what parts of the process of making moving pictures should be covered? Let me hear from you.

The Photographic Arts Supply Company of 39 West 60th Street, New York City, distribute a variety of camera and darkroom accessories. Write for their catalog and mention this department.

You make good prints, but then what do you do with them? One answer to that question is the Miracle Salon Brochure made by the Edwin M. Phillips Company of 420 Lexington Avenue, New York City. The brochures sell at one to three dollars for different size prints, and are so arranged that the pictures may be removed without damage to either the print or the holder, which may be immediately refilled. Write to the Phillips Company for data.

Are you thinking of a new flash gun? The S. Mendelsohn Company of 202 East 44th Street, New York City, have announced a new series of Speedguns that incorporate all the newest developments in flash photography. Full information on the new guns and on flash picture technique will be sent you if you address your request to the above company.

Remember that the time for getting into the 1940 contest is short. All entries must reach me by October 15, and those for the Flora contest in the November issue must be in my hands before September 15. The books are worth while—so is the grand prize!

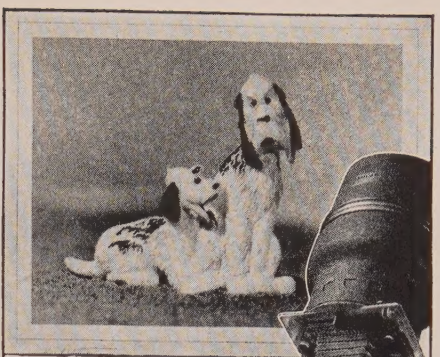
Remember, too, that this is your department. It should contain the kind of material you want, and I can succeed in supplying it only if you help me with your suggestions and criticisms. And do not forget that Camera Trails has a service to assist with your photographic problems. Address your letters to Norris W. Harkness, Nature Magazine, 1214 Sixteenth Street, N. W., Washington, D. C.

Adolph Kruhm

Suddenly, on June 5, Adolph Kruhm left this strife-torn world for one where peace prevails. His going leaves a void in the lives of the many who knew him personally, or who met him through his many articles on garden subjects. Recently appointed Garden Editor of NATURE MAGAZINE, he had mapped out a fine program of articles that now will never be written. In this issue his last article appears. Mr. Kruhm was born 56 years ago in Ehrfurt, Germany, a center of the seed trade of Europe. He came to the United States at the age of 16, and became associated with W. Atlee Burpee Company, finally assuming charge of this company's Fordhook trial grounds, conducting some 30,000 seed trials annually. Following years of experimental work, he began writing for the horticultural magazines. At his home at Hempstead, Long Island, he had one of the finest small gardens in that region, and many of his garden pictures were taken in his own little experimental ground. A few days before he passed on, Mr. Kruhm said that he had never been happier in his life, because he was doing just what he loved to do.

Forest Outings

Thirty foresters have collaborated to produce a book that, surprisingly, comes from the Federal Government. Edited by Russell Lord, it is a collection of interesting and informative stories of our National Forests and their significance in the recreational and economic scheme. Profusely illustrated with scenes in these forest regions, the book is given the title *Forest Outings,* and is printed by the U. S. Government Printing Office at 75 cents, paper bound and $1.25 bound in buckram.



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ON THE RECORD

An old English tune, "Under the Spreading Chestnut Tree," has more recently come into popularity as a sort of theme song for the British Boy Scouts, who render it with appropriate gestures. Even the King has proved particularly adept at this modern rendering. On two Victor Red Seal records, however, this song is presented in quite different form by the London Philharmonic Orchestra under the direction of Constant Lambert. On these two records (M654-1 to M654-4) we find a beautiful rendition of seven different variations on the theme of the old tune and fugue, the latter requiring one whole side of a record. Both variations and theme were written by Weinberger, and they combine to provide recordings that are unique and will delight music lovers.

•

There are many who place much faith in the signs of the Zodiac and their influences over the lives of man; in other words, in the teachings of the astrologers. Whether one credits astrology with soothsaying value or not is perhaps immaterial in noting the recordings Victor has made in a series having the group title of "The Zodiac and Its Mysteries." It strikes us as a smart idea to have captured on wax the astrological conclusions of A. F. Seward, astrologer of Atlantic City, New Jersey. Each record in this series has the meaning of the zodiacal period for two signs. For example, one record has Mr. Seward's ideas on the significance of Aquarius, covering the period from January 20 to February 19, on one side, and the meaning of Pisces, February 19 to March 21, on the other. One may purchase just the record for one's own birth period, or the entire set, so as to be prepared with the astrologer's information on the birth period of any friend who may drop in for a call.

•

It probably is because we mature slowly, but we get a lot of fun playing and replaying some of the RCA-Victor records that the manufacturers group under the general description of "Songs for Children." There are quite a number of them and we have reviewed and recommended several in this column. It is likely that we enjoy them because our musical demands are simple and these are simple little songs. Two new records in this group have come to hand, one with the songs rendered by Hollace Shaw, who we like on the air, too. Record #26527 has such little songs as "The New Moon," "Papoose," "Planting Rice," "Naming the Trees," "The Apple Tree," and others. Ruth Cathcart, contralto, joins Hollace Shaw in rendering some of the equally charming little songs on #26528. Most of the songs in this series are Nature songs, and many of them you have probably heard your youngsters singing when they come home from school. The piano accompaniment on both these recordings is by Helen Myers.

•

Popular taste in music leans to serious music if the public's requests for recorded music at the Record Music Room at the RCA exhibit at the New York World's Fair may be taken as a criterion. More than 1200 requests are made in a day and about 200 selections are played during the fourteen hours that the lounge is open daily. Careful tabulation of public desires was made and revealed that during the first month of the Fair this year eighty-three and one-half per cent of the requests were for serious music. Paul Robeson's recording of "Ballad for Americans" was by far the most popular record, so much so, in fact, that it has been put on a regular schedule.

Plant Labels

Aden J. King is a professor in the Department of Chemistry at Syracuse University, an inventor and a specialist in growing alpine flowers in rock gardens. This combination of interests and activities has resulted in the production of unique and handy plant labels. It all stems from a special alloy of metal that Professor King invented for use in radio receiving tubes. The alloy is soft, flexible, resistant to acids and ground chemicals. It is pliable enough to be rolled in reels like adhesive tape and soft enough to write on with a dull, medium-soft lead pencil. Each label of the 65 in one reel is slotted so that a small, light band may be placed around a stem or twig, much as one bands birds. Calling in a businessman brother, Professor King named this product Perm-a-tag. It is sold by King's Garden Specialties, Syracuse, N. Y., at $1.00.

Gardening in California

Apparently if you have gardened anywhere else in the country, and then start to practise your arts with flowers in California, you must virtually start all over again. You must learn how to plan your Christmas garden; to get used to the idea of sowing pansies in July to flower in November; to transplant March-flowering annuals between Thanksgiving and Christmas. In other words, you need a guide book, and such is *Gardening for Fun in California.* Here is the what, where, when and how of the year-around garden program in our great western state as told by Jean-Marie Consigny, with the assistance of Charles Palmer. Setting off the immense amount of information and advice in this book, the text is entertainingly written and the illustrations both interesting and effective. The publisher is George Palmer Putnam, Inc., Hollywood, California, and the price is $2.50.

About Begonia

Several interesting articles on begonias have appeared in recent issues of the *Journal of the New York Botanical Garden,* and have contained much valuable material on culture and species. In order to bring this information together the Garden has republished the articles in a 44-page booklet under the title *Begonias.* It is a most useful publication and is available for twenty-five cents from the New York Botanical Garden, Bronx Park, New York City.

Correspondent

Joseph Painter of 499 Hamilton Street, Albany, New York, wishes to be added to the list of those interested in corresponding about Nature subjects, particularly herpetology. So would Barbara Backmann, 104 N. Eddy St., Fort Scott, Kansas.

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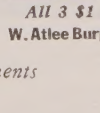

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The Voice with a Smile

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"We once called a fellow at a hotel in Philadelphia but he had just departed on an automobile trip in a westerly direction. A few days later the long distance operator caught up with him in a little town in Missouri and he was the most surprised man in all but one of the States of the Union. The exception was New York. We were the most surprised there. To this day we have no idea how the operator did it."

DAMON RUNYON
in the *New York Mirror*

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The Bell System cordially invites you to visit its exhibits at the New York World's Fair and the Golden Gate International Exposition, San Francisco.

Nature in Print

By HOWARD ZAHNISER

WHEN THE author of a book published in the year of our Lord Nineteen Hundred and Forty has the perception and vision, the courage and boldness, and the eloquence arising from deep sincerity to interpret persuasively in terms of small things the needs of a world tense with the ignorant clashings of tremendous military forces, it seems appropriate to welcome him as a candidate for the mantle of the seers that was once worn in this country by Henry David Thoreau.

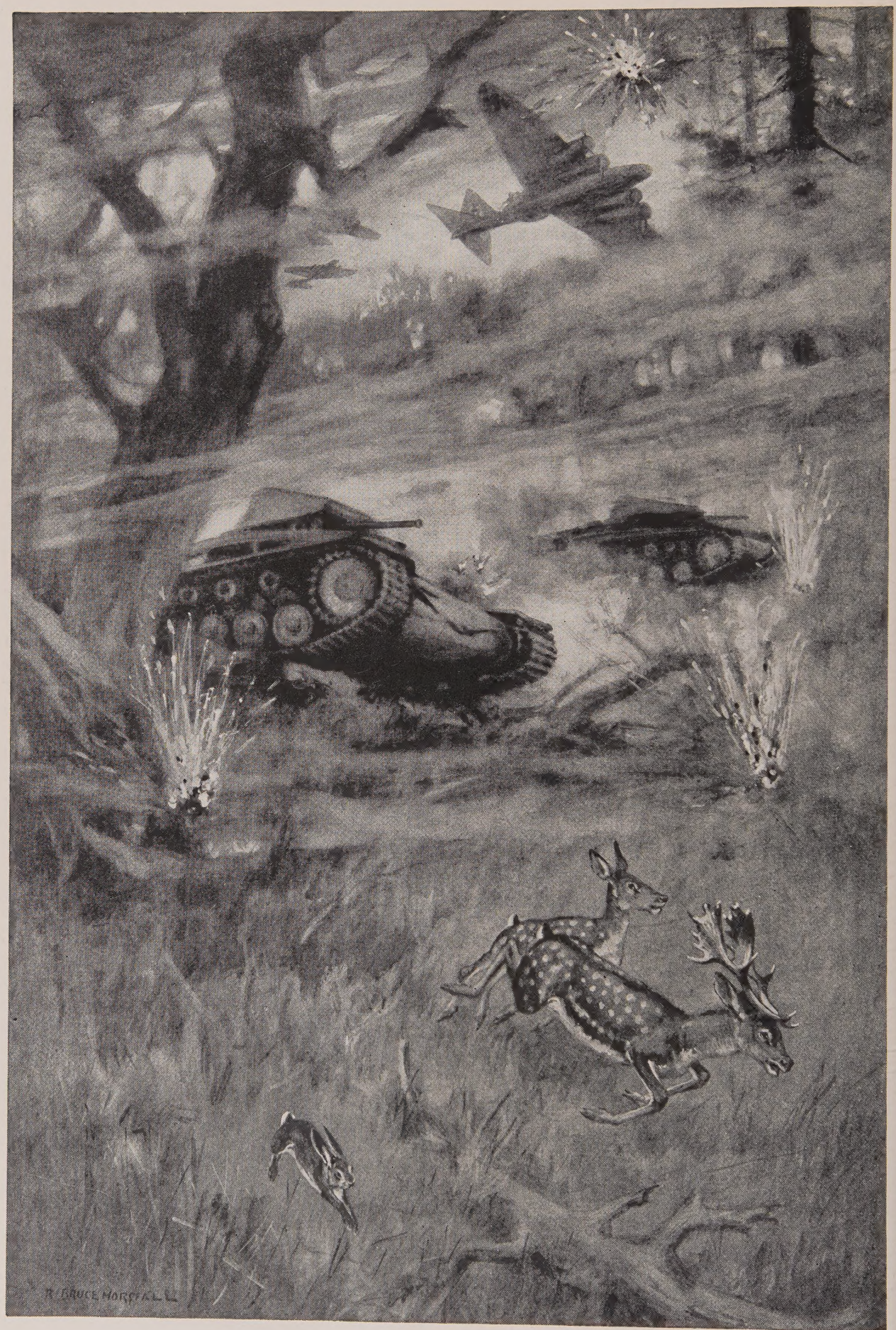
When Alan Devoe, a young man born as recently as 1909, published three years ago a testimonial and an outline of his chosen way of living, in a small book called *Phudd Hill* (Julian Messner, Inc., $2) for his country home, there was cause for interest and the sort of pleasure that comes in sharing the delights of another. Mr. Devoe left no doubt that he was deeply sincere when he then wrote that, "although there is small trace of the hermit in my make-up, I extract from this life of 'isolation,' as my friends sympathetically term it, a deep and endless delight;" but at the same time he left the impression that no matter how much the rest of us might charitably envy him, we could not hope to emulate him. We could vicariously share his satisfaction in living so that "letters long unanswered—bills long overdue" could "assume no very formidable proportions." We could well understand how the fortunate young Mr. Devoe, "living thus in daily contemplation of the vast swing and surge of the eternal cosmic machinery," could very plausibly see the "minor woes of man assume a triviality and utter insignificance." Nevertheless, the stark fact was that many of these "minor woes" were definitely our own. Not all of us could live in the country, escape the routine compulsions of employment, or minimize below a distressing level the worries of a correspondence that would always include too many financial statements. Our Phudd Hills were for the most part "no more than a longing in the heart," although we shared with Mr. Devoe the gratitude he expressed in dedicating his book to those who had made his own Phudd Hill more than a longing.

Now, with the publication of Mr. Devoe's *Down to Earth: A Naturalist Looks About* (Coward-McCann, Inc., $2.50), there is reason for a deeper and more personal gratitude, for this book is pertinent to our own personal lives and our whole human life. The "auguries of Phudd Hill" concerned more than weather conditions. Mr. Devoe's non-social way of living has come to have the same sort of social significance that Thoreau's had. The writer's and thinker's work-shack in the woods described in *Phudd Hill* has proved to be a "successful" establishment. Mr. Devoe has been well employed. We can all be thankful that he has been able to eschew our "perfected" standards of living and withdraw to where he can observe and think and write—write clearly and descriptively but with contemplation and emotion, reverence and wonder and the earnestness of a seer. We can be thankful that he now, having lived close to earth, also "looks about."

"It is a time," Devoe announces, "to think of Small Things. It is a time to walk through city streets with a deliberate unawareness of the clangor of the moment, listening instead for those small sweet sounds that are forever—the rush or whisper of the clean wind, the little silence of dry leaves as they whisk along the street, the tiny calls of sooty sparrows. It is a time, if by hook or crook we can manage it, to quit the city wholly for a little while—for a day, for an hour—and to walk in a meadow or climb a mountain or just sit on a fence-rail."

Yet Mr. Devoe makes it plain that such a pronouncement is not meant to provoke personal retreats from the confusion of human life, but rather to point a way toward the resolution of the forces that confuse and frustrate our living in accordance with the inescapable essential demands of the natural earth, on which we are entirely dependent. He suspects with high seriousness, for example, that a four-line item on page thirty-six of his paper under the heading "Blister Rust Spreads in California" may be more significant than the first-page headlines to war news. He points out with fresh and more persuasive warnings the results of our already "too civilized" exploitation of our natural resources without an understanding of their characteristics and their importance. He realizes the social order that could be brought about if human beings sought diligently to live in spiritual harmony with the natural forces of the earth. "I am not at all sure," he writes, "that understanding something about a hellebore is not prerequisite for understanding something about Hitler, and that a sane and simple contemplation of the basic ingredients of our universe, and of their interplay, may not prepare a man to evaluate with a sounder judgment such vagarious happenings as wars and famines and shifts of ideologies."

Although it seems important to realize the significance of *Down to Earth*, any impression that this is a book merely of preachments to be studied and pondered will quickly be corrected on only casual examination. The serious implications are obvious throughout the work, but Mr. Devoe's philosophical considerations are made explicit only in the introduction and in a final group of chapters in a section on "The Nature of Things." Throughout the three other sections—on "Creatures", "Weathers and Seasons", and "Animals and Adventures"—Mr. Devoe is engaged in his own "sane and simple contemplation of the basic ingredients of our universe," and he writes with a clarity and charm that make his essays rank high in interest, delight, and entertainment. I am sure, for example, that Mr. Devoe's essay on "The Life and Death of A Worm" and one entitled "Concerning Cats" would not suffer by comparison with the best essays that have been written. This is certainly a book that should arouse enthusiasm—evidence that there is another author in our midst who can be expected for some time (Continued on page 427)



CIVILIZATION!

NATURE MAGAZINE
VOL. 33 • AUGUST-SEPTEMBER • 1940 • NO. 7

War and Wildlife

By J. D. U. WARD

In view of the terrible destruction of human life and property by war in a world that still regards itself as civilized, some may question the advisability of concerning ourselves with so minor a matter as war's effect on animal life. Since, however, man hopes to go on living, it is a matter of no small importance. With the "refinements" of warfare in evidence in the present struggle, it is too soon completely to estimate its bearing upon wildlife. The war of 1914-1918, however, proved many things, and events that have taken place since the present catastrophe was forced upon much of the world, indicate more. In this article, by a British writer and student of wildlife, many interesting and thought-provoking facts are brought out. We feel that the importance of the subject justifies departure from our editorial policy of leaving discussion of the war to the daily press and magazines concerned with current history.—EDITOR

WHILE a great war transforms the lives of whole nations, and grave economic disturbances persist for decades after arms have been laid aside, wildlife as a whole remains little affected, even in the countries of conflict. To this broad generalization there are exceptions. Certain species may, because of particular circumstances, suffer or benefit considerably from war, and individual animals in the areas of conflict may be accidentally involved in various ways. The war of 1914-18, for example, probably saved the Scottish wild cat from extinction, and the same war provided perfect conditions for a terrific plague of mice in Australia. In the early days of airplanes in warfare a high-flying hawk once caused much alarm on the western Front.

It is patent that any species of animal whose numbers are deliberately controlled by man will be affected by the suspension of man's control. Up to 1914, the true wild cat of the Scottish Highlands had been trapped and shot so that its complete extirpation seemed assured. Then came the war. Game-keepers returned from the service in 1919 to find the wild cat relatively numerous. Since then, wildlife has come to be better appreciated, and *Felis sylvestris* has not again been treated so hardly; the reprieve of 1914-18 came just in time.

In France, as soon as the game-keepers were called, wild swine were free to multiply without check. Being at the beginning much more plentiful than wild cats, and by nature much more prolific, they soon became a serious pest. When, at length, the French Government took action, no fewer than 40,000 wild boars were killed. There was a comparable wild boar plague in parts of Spain during the recent civil war.

In what was pre-war (1914) Russia, hostilities had a most unfortunate zoological effect. The numbers of wisent, the true European bison, were already small, and, by the time the war was over, it was found that most had been transmuted into beef. The few surviving members of the species were, however, collected and conserved with great care, and there were hopes that the wisent had been saved. Whether the species can survive this new example of human madness is doubtful, for the specimens in zoos (Woburn, Amsterdam and Stockholm) are probably too few and too closely related to ensure the perpetuation of the race in its purity.

In certain parts of Europe the numbers of elk and red deer were much reduced between 1914 and 1918. The killing of animals either for food or to save food, in such hard times, is almost inevitable. For instance, in the Civil War of the sixteen-forties Great Britain lost not only many herds of park deer, but also most of her wild white cattle. During the present conflict, many deer have been shot at Chillingham in order that the available feeding grounds may be kept for the famous herd of wild white cattle. In other areas—Ashdown Forest, for example—special measures have been taken against the deer that raid the farmers' precious crops. It has been claimed that one deer will, because of its picksome and destructive methods of feeding, do as much damage as five hundred rabbits. In Scotland a special commissioner for deer control has been appointed, and abnormal numbers of deer have been killed. Venison, which is not a popular meat in Britain, has been boosted,

and the novelty of venison sausages has appeared in some places.

Martens, polecats, badgers, foxes and rats all multiplied in Britain during the war of 1914-18, and, because there is now rather less fox-hunting, a special eye is being kept upon foxes, and some shooting has been ordered. In France, rats became almost a major curse during the last war. Cats were kept in the trenches, and terriers were sent by the truckload to the worst infested areas. Restrictive measures were also instituted by the American Expeditionary Forces. The accumulation of stores in places where they could not be protected, and the ghastly supply of other fare in No Man's Land, meant that the rats could feed anywhere, and measures taken against them were at best palliative.

In Britain, rabbits held their own, despite the fact that a price of five shillings a couple made rabbit-trapping more profitable than it had ever been before. Wild rabbits are still an uneconomical source of food, since the damage they do in an intensively cultivated country is out of all proportion to the meat they provide. Accordingly, a new law enabling local authorities to take action against people who harbor rabbits in woods and other places, whence they come out to feed on the lands of others, is likely to be invoked in Britain.

PHOTOGRAPH BY JOHN H. VICKERS

A FOX PEERS FROM ITS "EARTH"

Foxes increased in the covers of England during the War of 1914-18. They are still plentiful because of less demand for the sport of hunting

In Australia, the assembly of enormous quantities of grain—for the most part in paper bags—at inland depots and on docks provided perfect conditions for a mouse plague that was perhaps unprecedented in its proportions and gravity. Yet the mouse disease, which checked the plague, was not wholly welcome, since there was fairly good evidence that it was transmissible, in various forms, to both human beings and horses. A bad mouse plague is an affliction only a few degrees less grave than that which befell Sennacherib, when innumerable voles caused defeat by coming in the night and gnawing away the quivers, arrows and bowstrings of his archers.

During the present war no declines of mammalian life have so far been reported, but it is not yet possible to know war's effect on the breeding season. In Finland, many bears are said to have been killed for their meat by the ill-fed Russian troops, and it is reported that in some areas foxes may have given place to wolves. The stock of foxes in certain parts of Finland had, incidentally, been strengthened with infusions of Canadian and Russian strains in the interests of the fur industry. The Finns were fortunately able, weeks before their submission, to drive more than 10,000 reindeer—constituting a notable store of meat and leather—to the Swedish frontier. However, reliable estimates indicate that, between war and a severe winter, some 60,000 reindeer were destroyed.

Of the present war's probable effects on wild mammals, perhaps the most serious relates to seals and whales, the slaughter of which will be intensified because of the demand for fat, oils and other products. The prospect for whales, in particular, is grim. Within the present century the whale population of the world has been catastrophically reduced, and, when negotiations to limit whale-killing so that no species should be extirpated were in progress two or three years ago, governments and whale-killers were not willing to accept restrictions that were adequate to conserve the stocks. That was in time of peace. Now that war has come, and the demand and prices for whale products are enhanced, it seems likely that the whales will be hunted down with even less consideration than before. Should the war be prolonged, another two or three species may well have been rendered virtually extinct. Whale oil is used for making margarine and soap, and for both the finest and the heavier lubricants. An adult blue whale may yield more than twenty tons of oil. Furthermore, whale meat is valued as a food, particularly by the Japanese. A fifty-foot finback whale will yield two and one-half tons of good meat, fit for human consumption, and vast quantities of by-products are available. Immature whales provide the best meat, but adults yield the most oil.

No blue whales less than seventy feet long, and no finback whales less than fifty-five feet long, can legally be killed. Still, whales of these lengths are not sexually mature, although, unfortunately, the majority of the catch of these great species consists of animals that have never bred. In short, whalers are following the example of the man who killed the goose that laid the golden eggs. When the blue and finback whales have been virtually extirpated (as other species, whose taking is now completely prohibited, have been before them) the demand for the species remaining will be increased. Thus the whaling industry will accomplish its own suicide.

It would not be true to say that the war of 1914-18

FAMOUS FRENCH DOG MESSENGER

This canine hero has been used to carry messages between different posts along the fighting front. Many dogs travel with troops, usually as mascots.

saved the golden eagle of Scotland, as it probably did the wild cat, for *Aguila chrysaetus,* though rare, is not now threatened with extinction. But Scottish naturalists have estimated that there were, in 1919, ten golden eagles in the Highlands for every one that existed in 1914. Even if this be an exaggeration, it is safe to say that the birds multiplied. In England, kingfishers and, probably, herons benefited in much the same way. Even in the farthest corners of the world, birds of fine plumage, normally killed so that their feathers might be used in millinery, enjoyed a respite.

It may be recalled that certain ornithologists in northern England attributed the shortage of warblers in the summer of 1936 to Mussolini's action in suspending bird-protection orders in the interests of Italian national food production during the sanctions episode of the Italo-Ethiopian war. But they were probably mistaken. Most warblers passing through Italy go to central and northern Europe, and Britain's immigrant warblers travel by way of the Iberian Peninsula and western France. It should be added that, when great numbers of wild geese appeared in England in March, 1917, a special order to allow shooting of the birds a month out of season was granted, as wild geese are good food. The extension, this present year, of the pheasant and partridge shooting season was for another reason. There had been so little shooting during the winter that breeding stocks surviving in February were far too large.

In 1916-17-18 there was an ill-considered and irresponsible campaign in certain sections of the press of Britain in favor of killing small birds indiscriminately, partly because they ate human food, and partly so that they might themselves be eaten. In Britain the economic value of birds as pest-destroyers was not then so well-recognized as it is now.

War's effects upon game are various. With the suspension, twenty-five years ago, of intensive preservation and feeding, the population of pheasants fell steeply, for pheasants are the most "artificial" of all birds. Grouse, *Lagopus scoticus,* and partridges, *Perdix perdix,* are less dependent on human nurses, and, as the weather and other circumstances were good, both species were abnormally plentiful in the 1915-16 season. The effect of keepers' absences was more than offset by the lesser amount of shooting. The effect of the war on shooting rentals was of course disastrous. Moors previously let for 4000 pounds were down to 200 pounds, despite the heavy crop of birds. In Britain, practically all shooting except rabbiting and coastal wildfowling—for ducks, geese and waders—is of a private nature; there is no game shooting for a poor man, unless he has rich friends.

Apart from a reduction in the number of pheasants and deer, no forecast of the effect of the present war upon game in Britain can be made. In Finland capercaillie benefited greatly from the Russo-Finnish conflict. In a

THE PIGEON AS A PHOTOGRAPHER

Military intelligence service has experimented with these birds, equipped with small cameras, flying to take photographs over enemy lines. A timing device regulates the exposure.

normal winter the Finns shoot some 14,000 of these great woodland grouse, mostly for export, but last winter the birds were little molested. Where conifers are intensively grown for commercial purposes, capercaillie have the habit of breaking off the "leaders" of young trees.

Among minor effects of the 1914-18 war on British bird life was the extension of the range of the greater spotted woodpecker, which moved from some of its normal haunts because of the felling of timber. Afforestation made certain favorite regions unattractive to the stone-curlew and attractive to crossbills. On the front in France owls and kestrels multiplied because of the unlimited supplies of rats and mice to be obtained there. At the same time it was observed that certain species of birds were little affected by hostilities. Skylarks sang freely over No Man's Land—even during bombardments—and warblers carolled and nested in reserve trenches. Some birds even nested on big guns, nor did they always desert when the guns were used.

ENGLISH PHEASANTS DECLINED DURING THE LAST WAR
This bird is not a native species and is raised under almost domestic conditions, so it fell off with lessened care

It has been suggested that during the present war an increase in the numbers of house sparrows in Britain must be expected, because gasoline-rationing has brought more horses back on the streets. The increase, however, may not come about if horse-keepers use the more thoroughly-digestible crushed oats, instead of whole oats. Anyhow, a less speculative cause of sparrow-multiplication is to be found in the country, where the acreage devoted to the cultivation of grain has been greatly extended.

In the interests of self-defence the Dutch authorities flooded great stretches of Holland, and bird life is believed to have suffered seriously.The canal-intersected lowlands of that country are among the greatest of semi-natural bird reserves in the whole world. Birds, such as the spoonbill, long since extirpated from Britain, nest freely in Holland.

The effects of the last war upon insect life were, as might be expected, mostly of an indirect character. Thus the ploughing-up of land, and the reduction of pheasants, led to a multiplication of wireworms. The winter of 1916-17 was so severe that vast numbers of insectivorous birds were killed. After this winter came a special spring ploughing campaign; thus insect pests were at once relieved of most of their predators and given positive encouragement to multiply. It was computed that thirty per cent of the crops expected from arable land in 1917 were destroyed by insects. In some places house-flies proved to be an abnormally grave nuisance. These pests can of course be a deadly menace in temporary encampments where the sanitation is of a makeshift or primitive character.

The war of 1914-18 caused the rivers and lakes in the battle areas of the Western Front to be almost depopulated of fish. High explosives, poison gas and foul effluents of all kinds did their evil work. Even in safe base areas, fish were sometimes destroyed by soldiers who, bored with unchanged rations, found that hand-grenades could be used to kill other things than human enemies.

An interesting development of the present war was the official advice that the English make use of home-bred eels—instead of paying Denmark and Holland one hundred pounds a ton for the great quantities of live eels. Now that these sources are cut off the suggestion has special point. It is computed that Britain's rivers, canals and ponds could yield 10,000 tons of eels a year. Eels, however, although commonly retailed at patrician prices, have for the last generation or two been regarded as plebeian fare, despite their high food value and their flavor. It is not generally known that there is at Epney-on Severn a special elver-catching station, whence some 5,000,000 elvers were every May sent to Germany for the re-stocking of inland waters in that country. During 1919 the British Ministry of Agriculture and Fisheries had control of this station, but it subsequently went back to the Germans who had their usual supply of English elvers so recently as May, 1939. This May, however, it was different.

Fish life is thought to have suffered seriously from the explosions of torpedoes, mines, bombs and the boilers of sinking ships which have killed millions of fishes in the Kattegat and Skagerrak.

During the Spanish civil war French fishermen from Hendaye and neighboring places complained that the shoals of sardines, which were their livelihood, suffered

THE RED DEER OF ENGLAND

Closely related to our "elk", it is usually raised under fence because of its destructive feeding habits. Venison is not popular food in England

PHOTOGRAPH BY JOHN H. VICKERS

disturbance by the searchlights of General Franco's patrol vessels.

Geese flying over Flanders were occasionally pulled down by rifle and machine-gun fire, and partridges behind the lines were ridden down by cavalry subalterns. Occasionally birds in No Man's Land were "potted" by snipers, and in some base areas the French authorities relaxed shooting laws in favor of British and Amerian soldiers behind the lines. During the present war there is said to be a strict rule against even the shooting of rabbits by troops. It has, nevertheless, been recorded that a French general, inspecting the kitchens, rose to the occasion when he saw three rabbits stewing in a pan from which he had lifted the lid. "Ah," he said, sniffing appreciatively as he slowly replaced the lid, "what good beef!"

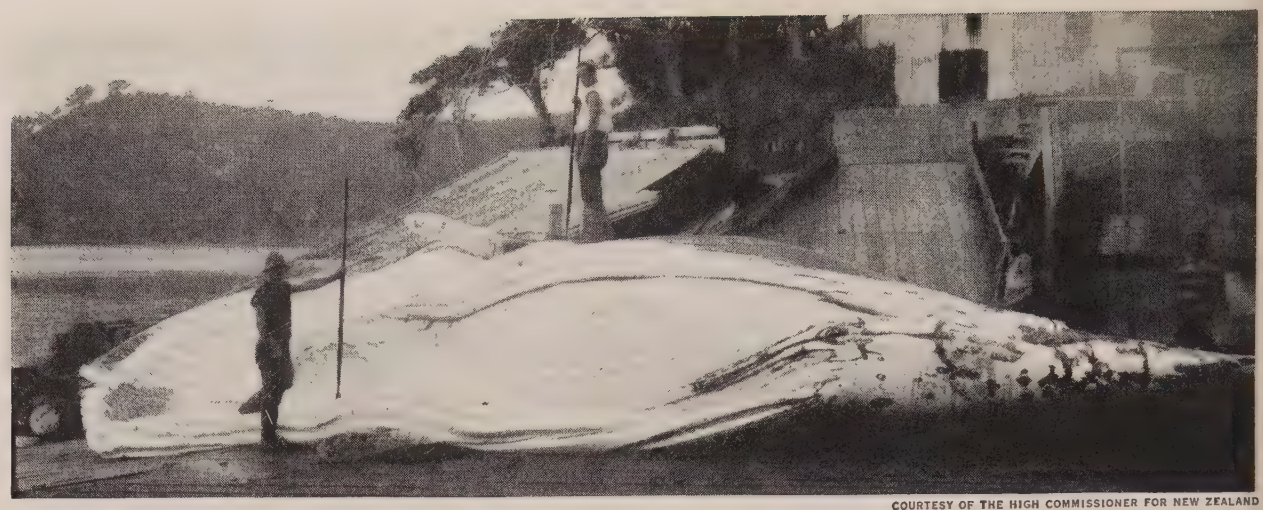
In 1914-18 bats, rats, mice, worms and insects were killed in considerable numbers by poison gas, but birds seem to have suffered relatively little. Apparently most of them recognized the oncoming gas as evil and departed; others flew or perched above the level of the low-drifting death-clouds; others seem to have been able to live in concentrations of gas that were dense enough to be unpleasant or deadly for human beings. This is surprising because birds—especially canaries—are commonly regarded as ten times more susceptible than man to poisoned or used-up air. This is why they are used in land mines and similar places to give warning of any deficiency in the ventilation. In this connection there is a tale of a British officers inspection of a land mine with a long tunnel. Seeing canaries in their cages at the mouth, he asked why they were not at the far end to warn the sappers of the fouling of air. "Well, sir," was the stumbling apology, "to tell you the truth, sir, the poor little beggars passes out so quick down there, the men don't like to take 'em along." Incidently, the demand for canaries, combined with the suspension of German supplies and the calling-up of English breeders, caused a great canary shortage. Even in the United States the price of canaries was doubled before the last great war came to its close.

Unfortunate animals, much used in poison gas experiments in Britain, were monkeys, of whom thousands were sacrificed. Goldfish were similarly employed although to a much less extent. During the Italo-Ethiopian war the price of goldfish in some international markets rose because of the enlistment of goldfish breeders in Italy. Some of the deep sea fishes killed by explosions have been netted, both by naval vessels and by fishing trawlers which have been the object of German aerial attacks. The fish are a welcome addition to naval rations.

During the 1914-18 war it was noticed that shellfire and the underwater explosions in sinking or sunken ships took a toll of fish that gulls appreciated. For instance, when the *Blücher* was sunk in January, 1915, gulls were quickly on the scene. In time of war gulls miss the fish offal and scraps that they normally receive from trawlers and other vessels. For the present, crews are forbidden to throw

THE EUROPEAN RABBIT

In England rabbits held their own during World War I. They are not economical as a source of food because they are so destructive to farm crops and control is now being exercised



COURTESY OF THE HIGH COMMISSIONER FOR NEW ZEALAND

STRIPPING BLUBBER FROM A FINBACK WHALE

Of all the large animals the whales are regarded as the most threatened by the present war. This is because of the great quantity of oil that is yielded by the large carcass

scraps overboard from British ships during daylight, since a trail of scavenging gulls would inform a U-boat that a vessel had lately passed.

Gulls are said to be attracted to mines and submarines. During the last war, ships were saved from striking drifting mines by gulls' perching on them and thus advertising their presence. As to submarines, it was suggested that the gulls should be trained as U-boat detectors by being fed from submarines! Seals actually were trained, early in the last war before hydrophones were improved, as locators of U-boats, but they were not entirely satisfactory.

Both in the last war (especially during Germany's unrestricted submarine campaign in 1917) and now, gulls, cormorants and other sea birds are suffering greatly increased casualties from oil. The oil escaping from sunken vessels—some of which have been tankers—has done deadly work, and hundreds of victims, still alive but doomed, have been washed up on the shores of Britain. The numbers of some gulls might with advantage be reduced, but a more humane and profitable method would be to collect a larger quantity of their eggs for human food in May and June. At least one whale has struck a mine. Its body was washed up on a Belgian strand.

A few "rescues" from sinking ships—a monkey, a falcon (now in the London Zoo), several cats and a dog, for examples—have achieved publicity, but the solitary rabbit killed by a German bomb dropped in the early air raids on the Shetland Islands became quite famous. Alternative versions of its subsequent fate are that it was released, with a label addressed to Göering, over Germany by the R.A.F., and that it was stuffed and appeared nightly on the stage of a London music hall. Several rabbits, as well as flocks of sheep, a donkey or two, pigs and cattle, have come to grief in No Man's Land during the present war through having inadvertently exploded land mines or booby traps. The battle of Belgium and Flanders did, of course, take an unknown toll of wildlife in the areas that have been heavily bombed and shelled.

During the war of 1914-18, horses, mules, dogs and homing pigeons all suffered heavy casualties. An example of the exploitation of insects, which comes more properly under the heading of wildlife, was reported from East Africa. Some Germans, retreating before a superior British force, noticed wild bees' nests in trees beside the path. Having wired the trees, they switched on an electric current when our men came to the spot. The ingenious scheme achieved some temporary success. From China have come reports of the use by the Japanese, during the last two years, of bees as message carriers. The messages are reduced photographically and then clamped to the bee. But the method would seem to be far more trouble than it is worth, especially since four or five miles appears to be the limit of the insects' reliable homing flights, and war today moves fast.

In conclusion, a point that is often overlooked. Although war, with its necessity for mobilizing both man and money power, may cause conservation schemes and important research to be interrupted or suspended, it has at least one good effect on the other side of the scale. It takes naturalists of all kinds into places, and at seasons, where they would never normally be. During the last war, an officer serving in Salonika made a most interesting observation of the manner in which a female eagle will sometimes carry her young and train it to fly, and aerial observers were able to record some extremely interesting data about the speeds and altitudes of migrating birds. Trivial though these points may seem, they are the more worthy of note because, as we have said, war does not—broadly regarded—much affect wildlife. Probably the fate of the European bison, or wisent, has been decided by this time, and the only matter that is at present of major importance to naturalists as naturalists, and in which they might conceivably, by taking thought and using influence, achieve some good, is the future of whales. Here war has not so much created, as it has aggravated, the danger that threatens the largest animals in the world. Its seriousness depends, perhaps, on how long the war continues.

HUMIDITY

What is it, and what does it do?

By L. R. KOLLER

General Electric Research Laboratory

WHY IS A PICTURE OF THE BLOND AND BEAUTIFUL ANITA LOUISE USED WITH AN ARTICLE ON HUMIDITY?
Because human hair is used in a delicate instrument to measure humidity through its capacity to shrink and expand with moisture changes—and blond hair is best

"IT'S NOT the heat, but the humidity" is a common statement during the summer months, and very often it is true. But few of the people who make the statement know what they mean by humidity.

Let us look into the matter a little. If a bowl of water is placed in a closed room, water will evaporate for a time. Eventually, however, if the room is truly sealed with no leakage of air under doors or around windows, the evaporation will cease. When this state is reached, the air in the room contains all the water that it can possibly hold at the existing temperature, and it is said to be saturated. At a temperature of 68°F, if the air in a room 15 by 20 by 10 feet is saturated, it contains in the vapor form about a quart and a pint of water. If the temperature is raised, the air will be able to hold more water, and more will evaporate until the air becomes saturated at the new temperature. So at 90°F this same room would contain about three quarts of water if the air were completely saturated.

Fortunately for our comfort, the air rarely is anywhere nearly saturated; that is, it can always take up some more water. Fortunately, too, it is rarely completely dry either. So we find it necessary to devise a way to describe the intermediate conditions. Such a measure is the relative humidity.

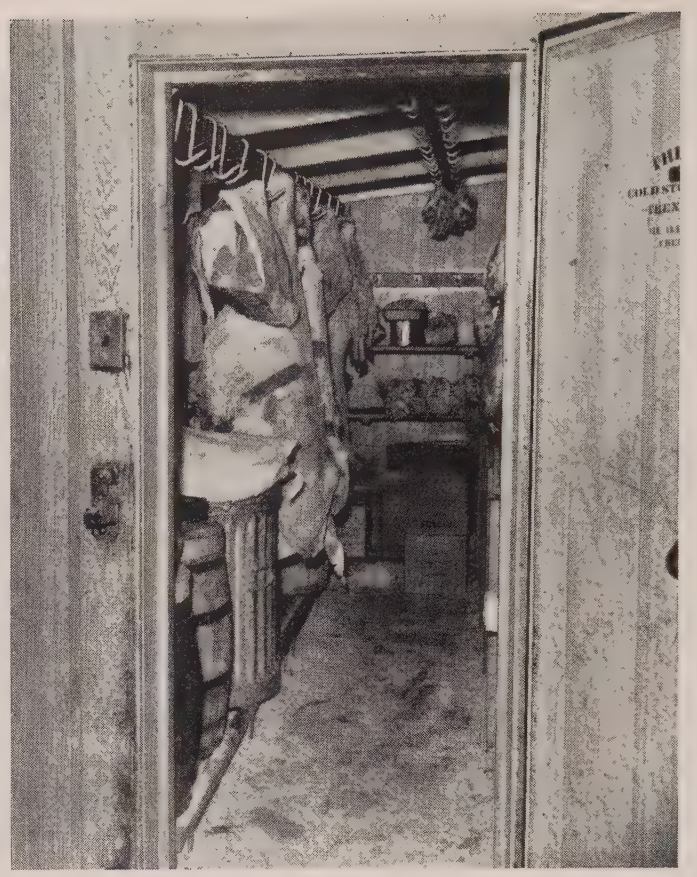
By relative humidity we merely mean the percentage of the air's capacity for holding water that is utilized at any time. Thus when we read that the relative humidity, or simply the humidity, is 50 per cent, we understand that the air contains only half as much moisture as it would contain if it were saturated at that temperature. Put more crudely, the air is "half full of water."

The relative humidity of the air depends upon the temperature. Suppose on a damp foggy day, when the air out-of-doors is practically saturated, we were to bring some of the damp saturated air into the house. (Even with the doors and windows shut, such a transfer takes place all the time through leakage under doors and around window frames.) Since the indoor temperature is higher than that out-of-doors, the air, which was previously saturated, is no longer so, and the humidity in the house consequently is considerably less than outside. This difference is particularly marked in the winter when the difference between inside and outside temperature is very great. For example, take a day when the outside temperature is 10° below zero and the outside air is, let us say, 50 per cent saturated. We take that outside air into our house and warm it up to a room temperature of 70°. But that air at 70° can hold so much more water than it could at sub-zero temperatures that it is 19 per cent saturated, or, in other words, the relative humidity is only 19 per cent. Thus in winter the air in our home is usually very far from saturation, or, in plain English, is dry.

Now if humidity were something we only read about in the weather reports we might not be so keenly interested in it, but in many ways it affects our comfort and, at times, even our pocketbooks, and we are apt to be sensitive to one or the other, or both of these.

We probably suffer more from high humidity than from low humidity. The reason for this is that our bodies have only two ways of losing heat. One way or group of ways is by radiation, conduction, and convection to the surroundings. However, if the temperature of the surroundings is 110° in the shade, a man whose normal body temperature is 98.6° cannot cool himself by any of these means because direct heat transfer can take place only from a body at a higher temperature to one at a lower. This is where the other process—namely, evaporation—comes into play. The evaporation of a liquid produces a remarkably cooling effect. This is made use of in tropical countries where water is kept in unglazed vessels. The water, constantly seeping through the porous walls and evaporating,

cools the jars and their contents several degrees below the surroundings. In a similar way the body secretes perspiration, which is largely water, and in evaporating this takes heat away from the body. Few people realize how great this effect is, yet the evaporation of a pint of water has the same cooling effect as the melting of about 7 pounds of ice. However, in humid weather when the air is nearly saturated, evaporation can take place only very slowly, so that we get very little cooling by this means. The beads of perspiration which trickle down our noses are only the symptoms of our discomfort and not the cause of it. The reason the breeze is so refreshing is that it removes the saturated air from our vicinity and replaces it with air that still possesses an additional capacity to hold moisture.



HUMIDITY IS OF MUCH CONCERN TO THE BUTCHER

Meat in storage dries and loses weight because of the low humidity existing in most refrigerators, where the temperature is so cold that it freezes out the water

You can see now that instead of saying "It's not the the heat, but the humidity," it would probably be more nearly correct to say it is the heat *and* the humidity, for as far as human comfort or discomfort is concerned, they are determined by the combination of these two factors. If the temperature is low we can tolerate high humidities, and if the humidity is low we can tolerate high temperatures. There is no one temperature at which all people would feel comfortable at all times. Similarly there is no one humidity at which all people would feel comfortable at all times, but the air-conditioning engineer has established a so-called comfort zone within the limits of which most people find conditions agreeable. This comfort zone includes humidities between 30 and 70 per cent and temperatures between 68° and 78°. You will probably find comfort at some combination of temperature and humidity between these limits, depending upon your health, age, habits, clothing, and the time of the year.

The relation between the amount of moisture in substances and in the air surrounding them is very important. If the air is dry it tends to take up moisture from the surroundings. Consequently in winter, when the humidity in our homes is low, our skin is being dried out at a rapid rate and chapped hands and lips are the result. Imperfectly seasoned wood gives up its moisture and shrinks, and cracks appear in the furniture. On the other hand, if the air is humid or nearly saturated, the surroundings tend to take up moisture. Then wood swells and warps, and any surface that is cooler than the air becomes coated with a film of condensed moisture. This is responsible for the dripping from cold water pipes and the dew on iced drinks. In fact, by determining the dew point, which is the temperature of a polished metal surface at which condensation begins to take place, it is possible to determine the relative humidity.

The engineer is concerned with humidity for many reasons other than humanitarian ones. The warehouse in which your next week's roast is now being stored is cooled by refrigerated coils which are far below the temperature of the surroundings. This results in a low humidity and a consequent drying of the meat and loss in weight. And the butcher who has bought a certain number of pounds of meat finds he has not quite so many pounds when he comes to sell.

In the textile industry humidity is important, too, for textiles take up and give off moisture depending on the surroundings. A buyer of wool does not care to pay for the water in the wool at the same rate as for the wool itself, although the seller might be glad to dispose of a few pounds of water for the same price as for the wool. The humidity is important in the textile industry for other reasons besides the weight of water in the fabrics. Fibers become brittle in very dry air and static charges make them stick to rolls and tend to bunch together, producing irregularities in the cloth.

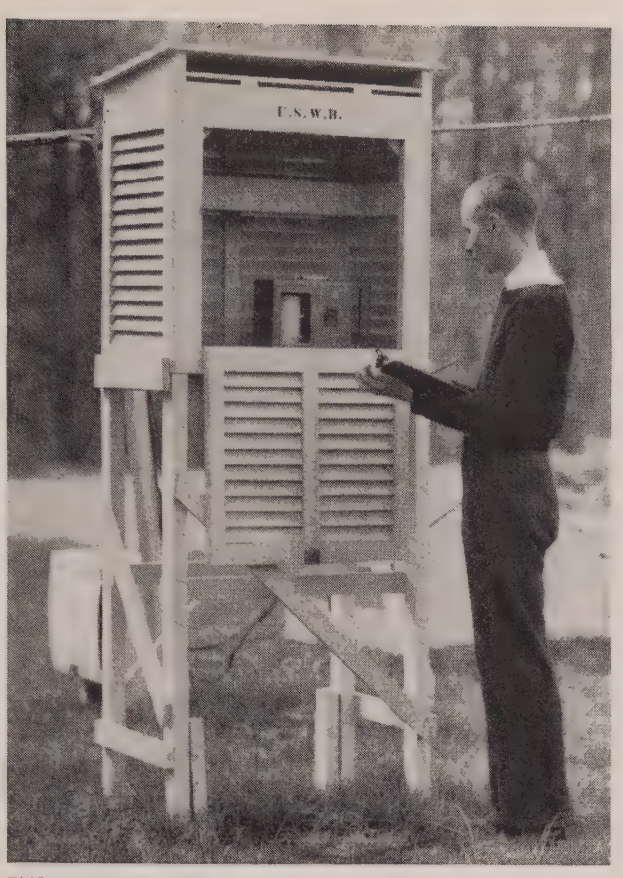
In printing it is important to store all the paper supplies to be used in a book under the same humidity conditions. If two lots of paper have been stored under different conditions and are then bound in a single book, when the atmospheric conditions change some parts will shrink more than others and a twisted and warped book will result.

The familiar sparks of static electricity produced when we shuffle along the carpet and touch a metal object are usually observed only in the winter. This is because it is only in the winter that the humidity in our homes is low enough to prevent the formation of moisture films through which these charges can leak off.

Your bread will be moldy, your cereal will not be crisp,

your powdered beverages will be lumpy unless they are made and stored under the proper humidity conditions. Humidity is also a factor to be considered in the storage of sugar, the manufacture of cigars, of confectionery, and many other products.

Charles Dudley Warner said that everyone complains about the weather, but no one ever does anything about it. The great majority of the people in the world must take the weather as they find it, without benefit of air conditioning. If you like low humidities you will be more likely to find them in the temperate zones than near the equator, far inland rather than near the ocean. But the geographical factors determining humidity are very complex and also include prevailing winds, enclosure by mountains, and altitude.



THE WEATHER BUREAU MAKES A RECORD
This instrument records both humidity and temperature, both of which have important bearing on weather changes and predictions and on comparative records of weather

As a rule the relative humidity is highest just before sunrise. As the day progresses more water may pass into the air by evaporation, but with the increasing temperature the capacity of the air for holding water increases so rapidly that the relative humidity usually decreases and reaches a minimum in the early afternoon. As the sun goes down and the air cools off, its capacity for water decreases again, and soon after sunset it condenses on cold surfaces in the form of dew.

Humidity can be measured in various ways. The dew-point method has already been mentioned. Another method uses the wet and dry bulb hygrometer, which would take too long to explain. A third is the hair hygrometer. The human hair has the property of shrinking and expanding with moisture changes in the air. On our heads this is a matter of small importance, but when the hair is put in a delicate instrument and caused to move a pointer as it changes in length, it becomes a very useful device. For some reason, and this is not merely an aesthetic preference, hairs from blonds are most satisfactory. A number of other materials, mostly of a fibrous nature, have been used in hygrometers to indicate changes in humidity by shrinking or twisting. None, however, have proved as satisfactory as human hair.

Another humidity-indicating device of a qualitative nature is the familiar little figure clothed in a dress that changes color with the weather. The dress is impregnated with a solution of cobalt chloride, which takes on a pink color when damp and a bluish one when dry. This device is supposed to predict the weather but, needless to say, it tells what has happened rather than what is going to happen, and is not an instrument of forecasting importance.

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Sunday Afternoon

By ROGER WILLIAM RIIS

Ten million turning, churning wheels from Maine to Mexico—
Socony, Purol, Shell, Good Gulf, Panam and Texaco—

Flats Fixed, High Test,
Hot Dogs, Tourists Rest
Red, Green, Stop, Go,
Sharp Curves, Drive Slow,
Goodyear, Dunlop,
One Way, Full Stop,
Dew Drop Inn, Bide-A-Wee,
Kill Kare, Sans Souci,
Detour on Dirt Road,
Bridge Weak, 2 Ton Load,
Slow Down to Twenty-five,
Honey right from the hive,
Vaporub for coughs and sneezes,
Paris garters, Come to Jesus,
Drive in, Eggs for sale,
Drive fast, see our jail,
Lions Club welcomes you,
Route eleven, route two.

Ten million blatting, snarling horns from Mexico to Maine,
It's been a lovely restful trip, and now we're home again.

Pet Egyptian Scarabs

By JOHN DEGROFF HALLER

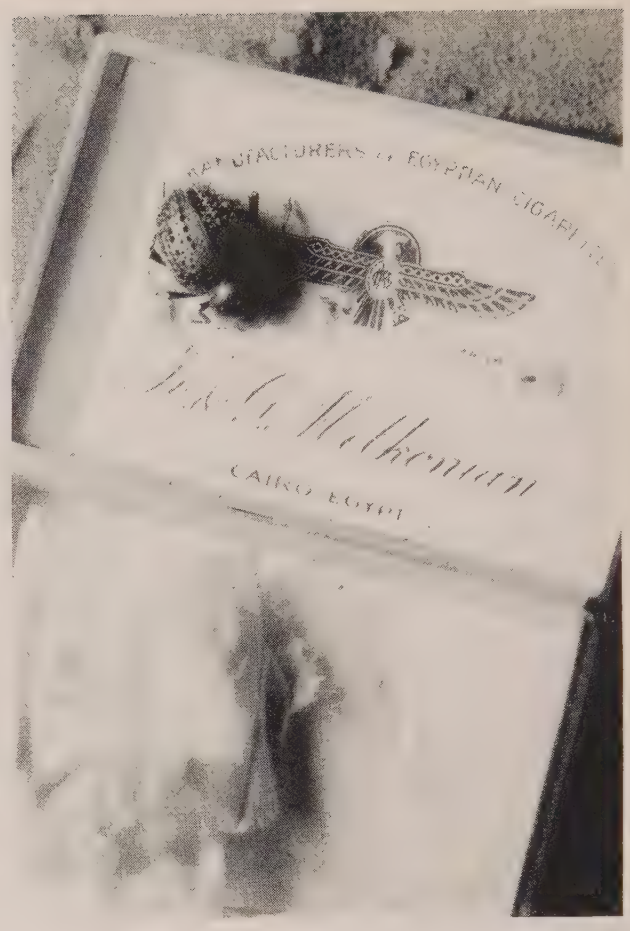
SCARABS were just jewelry, I had always thought, until I saw one running on the sand in Egypt. Before the war scared tourists away from the Mediterranean, my dad, mother, sister and I went on a cruise there, and of course we stopped at Egypt.

The day we went out from Cairo to see the sphinx and pyramids everyone else chose camels to ride, but I took a donkey because it went faster. While I was waiting at the great Pyramid of Gizeh for the rest to catch up to me, I saw a big, black beetle scuttling off across the sand. He was so big and shiny I caught him to find out what he was. My dad said it looked like an insect he called a "dung beetle" when he was a little boy in Maryland. Our guide (or dragoman as they call them over there) thought we were funny not to know my beetle was a scarab!

The scarab I had caught was such an interesting and lively, hunch-backed fellow that I decided to keep him for a pet, though he was not very friendly and pinched my finger when I tried to hold him. To keep him company, I caught two more scarabs, and gave my donkey driver a tangerine for another.

Until we got back to the ship, which was waiting for us at Port Said, the scarabs traveled in a cigaret box. Then they moved to a shoe box with some sand in it, so they would feel more at home. Bits of banana and tangerine were the food they liked best, and they seemed happy and healthy.

One of the scarabs crawled out of the box one day and met a horrified stewardess, who was making my bed, and that, unfortunately, was the end of him. The other three scarabs were contented to cruise in their shoe box, and returned to Vermont with us. During that summer, they were happy as crickets, but our first blizzard discouraged them so completely that they lost all interest in living. Although the scarabs are dead, they still look surprisingly life-like.



We looked up information on the scarab to find the connection between scarab jewelry and scarab beetles. The word scarab comes from the Latin, *scarabaeus,* and Greek, *karabos,* meaning beetle. *Scarabaeus sacer,* the beetle found in countries bordering the Mediterranean, was regarded by the ancient Egyptians as symbolic of resurrection and immortality. The insect lays its egg in a ball of dung, which it rolls over the sand to a place of safety. There are American species of the group with similar habits. Whatever the Egyptians may have understood by these actions, they compared the dung pellet to the globe of the sun, and the emergence of the young scarabaeids from it as resurrection. The insect was sacred to the sun god, and has even been found mummified. The Egyptian name of the insect was *kheper,* meaning "to become" or "to come into being," and a picture of the beetle is the hieroglyph sign for that meaning. Gems in the form of scarabaeids, and known as scarabs, were widely used as talismans or ornaments, and were placed within and on mummies as symbols of resurrection.

THE AUTHOR AND HIS DONKEY

Above is a scarab captured by the author near the Pyramid of Gizeh. Photographs by Marion S. Haller

Nature's "Jitterbugs"

By ELLSWORTH JAEGER

Illustrated by the Author

LONG BEFORE David danced before the altar of the Lord; even centuries before man's appearance upon the earth, Nature "tripped the light fantastic." Rhythm is one of Nature's legacies, in which even the most lowly forms of life participate. Our "jitterbugs" of today are no more filled with the dance urge than are some of the dance-minded insects, for the whole animate world dances, be it human, animal or insect.

There may be a difference of opinion among us regarding swing music, but it has been the favorite form of rhythm in one bug family for untold generations. When you examine the body construction of these creatures, you will readily see why swing is their selected rhythm. Two pairs of their legs are like thin, thread-like springs, between which their long thin bodies rest suspended slightly above the ground. Thus they look like animated swings themselves, as they gracefully sway up and down. At times a dozen or more of these strange insects may be seen, all moving, as if to the music of some unseen insect swing band. Because of their long, thin legs they are called the "thread legged bugs".

THE PORCUPINE SHUFFLE

That diminutive feathered jewel, the hummingbird, also likes to "swing it". When Cupid's arrows find the hummingbird, he acts like a love-smitten schoolboy. However, he is in tune with the modern tempo for swing then becomes his love expression. While his lady perches upon a convenient twig, seemingly unaware of his presence, he swings back and forth like a pendulum attached to an invisible wire. Back and forth he swings in a fixed arc of perhaps twelve feet. As he sways to and fro, he makes a sound like a bow drawn across 'cello strings. He also excitedly chippers sweet nothings as his swing accompaniment.

There are "fan dancers", also, among Nature's "jitterbugs". On hot summer roads you may often find this insect fan dancer performing. When resting on the ground he is almost impossible to see, so well does he blend with the earth clods. But when he spreads his wings in his fan dance routine, he reveals the gaiety of his attire. He not only dances through the air with the greatest of ease, waving his wing fans, but he creates his own orchestral accompaniment as well. The crackling of his castanets can be heard right merrily as he flies over the hot roadways.

One of the commonest of this fan dance ballet is the road hopper, *Dissosteira carolina.* The front wings of this hopper vary in color from blackish through brown and reddish. The sand-colored fan dancer, *Trimerotropis maritima,* with the pale yellow and black hind wings, is found on the shores of the Atlantic and the Great Lakes. It may be that this performance is only for the eyes and ears of some lady hopper, for Nature's children often dance when smitten by the love god.

Folks in love do many things that seem exceedingly strange to the rest of the world, and the woodcock is no exception to this rule. When he falls in love, he does not believe in keeping it to himself, but tells the world about it in spectacular sky dances. There are few bird ceremonials more interesting than this remarkable love dance of the male woodcock. He begins with a few vocal "peents", and then takes to his wings with a rush, sweeping on a spiral course two to three hundred feet from the earth. The air rushing through his stiff, narrow, primary wing feathers makes a high whistling accompaniment to his flight. Faster and higher he climbs and the more rapidly his wings beat, the shriller sounds his wing music. Reaching the peak of his flight, he hesitates a moment and then down he zig-zags, uttering a clear twittering whistle. While the demure eyes

AVIAN LOVE DANCE

of his lady are upon him, he repeats this performance over and over again.

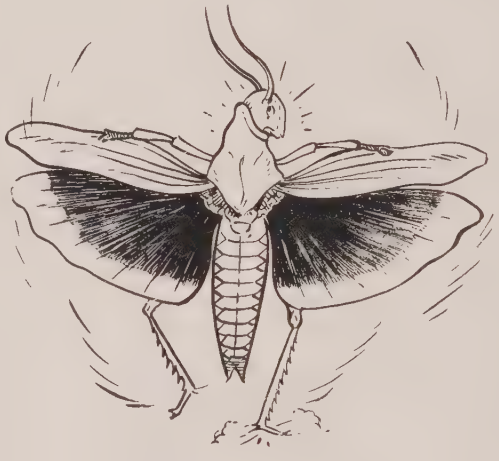
The horned lark is another aerial dancer. He soars from the meadow, mounting skyward in giant spirals, until he is almost lost in the blue. At the pinnacle of his climb he hovers a moment, pouring forth his song, and then, evidently overcome by the ecstasy of it, closes his wings and hurtles earthward. Down, down he plunges. His death crash seems inevitable. But within a few feet of the ground, he suddenly spreads his wings, checks his headlong fall and alights upon the earth like a bit of thistledown.

When we witness the curious "straw dance" of the purple finch, we are sure that the old favorite tune, "Turkey in the Straw", must be this bird's theme song. In the spring, when love stirs in the heart of the purple finch, he is inspired to give this ridiculous love dance. Ordinarily he is rather dignified, but at such a time his actions can be compared with the wildest conception of a savage dance. He begins his performance by picking up a straw and dramatically ends the dance by tumbling over, as if overcome by his emotions. However, a jab from his sweetheart's bill soon arouses him and a merry chase through the forest is on. At times, as a dramatic finale, he will strike a pose like the hero in some melodrama of the 'nineties, his head back and his chest thrust out. Suddenly the shy lady finch will hop up to him and clasp his bill. After this pretty show of affection, she scurries away, followed by her dashing admirer. This probably continues until she capitulates, and then they settle down to housekeeping.

The nuthatch also tells of his love in pantomime and rhythm. That the world loves a lover he seems to know very well, for when he finds a demure lady, who will listen to his plea, he does not mind letting the world know that he has found the object of his affections. And a most gallant lover he is. Like his human brethren, he brings gifts to his sweetheart, gifts of food, which he presents to her with a flourish as if they were beautiful bouquets or jewels. When fluttering before her in the ecstasy of love, he shows off every feather, spreading his tail and wings and fluffing his plumage. During this display of finery, the pair converse in low tones, no doubt murmuring sweet nothings. When her lover comes too close, the lady nuthatch demurely edges away, but she coyly follows him when he takes her refusals seriously. And so the romance continues, the male spreading his plumage mantle to show its richness, murmuring sweet words of love, and swooping away to secure some choice tid-bit, all indicating that he is head over heels in love.

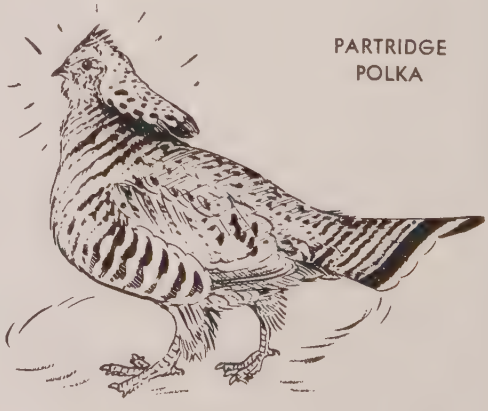
Many other birds and mammals have love dance ceremonials to attract their mates. With elaborate displays of their charms and strutting and dancing, they try to create favorable impressions.

The ruffed grouse, or partridge, has an especially interesting courtship dance. When the magic of Eros has wrought its strange charm upon this gay Don Juan, he exhibits his most dashing and colorful dress. His fan-like tail is spread and lifted, as well as his beautiful, iridescent ruff, which gives to him the swagger of a dandy of the Elizabethan Court. Drooping his wings stiffly to his sides, he struts beside the hen. Suddenly he picks at the ground and shakes his head from side to side, giving hissing noises. Then with a short, quick run, he dashes before the hen, attempting to hypnotize her by shaking his head so rapidly that the ruff becomes a blur of color. He brings the scene to a grand finale by turning stiffly upon his legs, and gradually merging his short hisses into one grand prolonged hiss.



INSECT FAN DANCER

The Turkey Trot was popular a generation ago, but have you ever seen a real turkey dance? Sometimes at dawn you can see the turkeys do a strange, high-stepping dance on the grass. The steps seem to be awkward hops, up and down jumps, and forward springs. This dance action is accomplished with lifted wings. Both the hens and the gobblers dance, the latter alternating the hops with pompous struttings. They also



PARTRIDGE POLKA

sing a musical accompaniment, the hens calling "quit, quit" and the males giving high-keyed rattles like a hard wood stick scraped rapidly along a picket fence.

The sage grouse and pintailed grouse are likewise dance-minded. Ernest Thompson Seton tells of a whole brood of pin-tailed grouse that had been hatched by an old hen. No doubt inspired by a feeling of joy and well-being, one of these baby prairie chicks, no bigger than a sparrow, proceeded to give his tribal dance. He lowered his head, his beak level with the floor, raised high the little pimple—where his tail would be some day—and spread his tiny wings. Then running and crowing a little bubbling crow, he beat his wings and stamped his feet so rapidly that it sounded like a little kettledrum. The result was electrical. Instantly the whole brood joined in the same performance. Each took the same position, and with their tiny feet pounding hard, the minute dancers crowed and careered in, about, over, and amid the others, leaping, bounding and stamping exactly as their parents do at love time.

Mr. Seton discovered he could always rouse them to a dancing pitch by rattling a tattoo with two fingers. These little fellows danced exactly as their parents did without ever having seen their parents.

The teals do a stately minuet, and many other ducks have elaborate ceremonies. It is difficult, however, to conceive the long-legged sandhill crane as a gallant, sentimental swain. Yet his courtship dance is an excellent example of the power of Cupid's bow. When he falls in love, he forgets any dignity he may have had and gives a demonstration of ridiculous antics. He hops and skips with lowered head, bowing low and leaping high, circling about the lady cranes until he has created so much excitement that they too join in the wild dance. To lend extra emphasis to the performance they give croaking whoops now and again, which add to the animation and din of the whole mad performance. It is like a wild dance of some savage tribe, and, like the savages, halts only after the last dancer is exhausted.

Many of our mammals, too, are jitterbugs. In the dusk of early evening that odorous wood pussy, the skunk, may feel the urge of the "light fantastic". A half dozen, or even more, will form a circle with their noses toward the center. Together the plume-tailed dancers move forward in stiff-legged hops until their noses touch and then move back again with the same prancing step. Thus they may enact this dance a dozen times, each movement as unvarying and precise as in the first performance. Then, quite as suddenly as they gathered for the dance, they disappear again.

One of the strangest rhythmic exhibitions I have witnessed was presented by an old male porcupine in Allegany Park, N. Y. For the greater part he seemed the dull, stupid animal. At times, however, when emotionally upset—if porcupines can ever be so—he would stand upon his hind legs and present a strange shuffle dance. He would slowly dance up and down in the same spot, thumping his feet quite audibly and clicking his teeth as an accompaniment, although in faster tempo. He was hunched up throughout the performance and held his forefeet close to his body. Thus he danced his "war dance", for such it must have been, since he made an attack immediately upon a neighbor porky, who was peacefully feeding nearby. Whether he was "counting ten" before losing his temper, or working himself into a fighting mood, is difficult to say, but it looked very much like a dance of war.

The elk or wapiti often succumb to rhythmic expression. They gather, at times, in a group and then plunge awkwardly about in a circle. All seem to dance in the same direction, following a leader, with heads held close to the ground. At first they seem to be milling about like cattle, but they accentuate their trotting with awkward plunges. This, no doubt, is an elk dance ritual.

Caribou, too, indulge in a "circle dance", which seems to be contagious. During weather changes, especially before and during high winds and storms, these animals seem to be affected by some impulse that urges them to run in circles, chasing each other, as if playing a game. They are entirely oblivious of their enemies at that time. These animals have been seen many times presenting this fantastic performance. They race around wildly in a circle, seemingly filled with the excitement of the wind and the fury of the elements, a veritable "storm dance" of the caribou.

And so Nature dances on. From the misty beginnings of creation, down through uncounted geologic eras, to modern times, living things, both great and small, have danced to the music of the Infinite—and probably will continue to dance as long as life exists.

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Extinct

By PAUL H. OEHSER

Once from your proud crater came
The passion of the earth, in flame.

Untamed and fathomless, you threw
Skyward your ample residue.

Far below your haughty crown
You buried an adoring town. . . .

But now a lake fills up your jowls,
Quiet, for fishermen and owls.

No ancient heat is left to thaw
The jagged ice around your maw.

And over your shoulders time has thrown
A cloak of mail, a cape of stone.

A RARITY OF THE RANGE

By JACK RICHARD

Photographs © Charles J. Belden

ALERT BUT SERENE

The eyes of this white antelope are light blue, while the usual color is brown. The white eyelashes give the animal a somewhat dissipated look

HAD it been born in the days of the Red Men there might have grown from that little bundle of flesh and hair a romantic legend of a white antelope that ruled the prairies of Wyoming, traveling alone and unafraid among the wolves, protected by the Great Spirit that it might give health and power to all who viewed it. The story would, no doubt, have taken its place along with those of the gray buffalo that was run over a rimrock and left to rot in the sun because the Indians thought it embodied an evil spirit.

As it was, this tiny bit of antelope oddity was born into a modern world, and, because it was found by a young rancher, survived the loss of its mother and grew to maturity sucking its strength from a rubber nipple on a milk-filled beer bottle. Bud Sanford, son of Archie Sanford, central Wyoming rancher, found the orphan—a pure white baby antelope. The find plunged him into the cowboy's idea of disgrace—having to walk back to camp without saddle horse—but Bud did not mind for in his arms he carried a rare treasure. But we are ahead of our story.

It was spring on the range. The Wyoming hills were turning a bright green as the snows melted under the warming rays of the sun. Bud was loping through the rolling country to meet the cowboys on a cattle round-up. The strong, even strides of his horse were sweet music to his muscles, and he was happy with the wealth of youth in the spring.

As he topped the hills and swung down into the wide-sloping swales his eyes would scan every brush and rock, picking out a rabbit here, a sagehen there, separating them from the tiny drifts of snow that still clung to the shady sides of the brush. At the top of a distant rise he spotted a horse, and then, his eyes long accustomed to catching movement of any type, focused on a bit of something white that seemed to flutter a trifle in the breeze.

Curious, he turned his horse in that direction, for snow does not flutter, and a white rag had no business so far out in the open country. As he approached, the spot began to take the lines of a small animal. He spurred his horse to a run and a minute later he held in his arms a tiny, two-day-old antelope, weak and nearly dead from lack of nourishment. He guessed that its mother had deserted it at birth because its color frightened her.

As he turned to mount, the horse, startled by the strange sight, bolted, and Bud, in cowboy boots and chaps, his "baby" in his arms, faced a long walk home.

Mrs. Sanford, Bud's mother, took charge of the latest addition to the ranch life, and, adopting the "bum lamb" technique, soon had the little thing's stomach full of warm cow's milk sweetened with Karo syrup.

All that happened about two years ago. The fame of the "white antelope of Natrona County" has spread far and wide. Hundreds of people drive to the ranch each month to view the strange creature. Its pictures have been splashed across the pages of the nation's newspapers, and offers have come in from many zoos. But still it remains at its adopted home.

The pet is not particularly healthy and the chances of

its surviving transportation and imprisonment in a zoo are small, the Sanfords argue. Besides, they say with a smile, it is so satisfied with its human companionship that it has never once offered to answer the call of the wild, although no fences bar the way to its natural habitat, the open prairies.

As to the species itself, it is zoologically as interesting as its history, and few men are better qualified to discuss its physical differences than Charles J. Belden, dude and cattle rancher, well-known photographer and the foster father of Wyoming antelope.

Belden, whose father-in-law, L. G. Phelps, twenty years ago had his cowboys deputized as game wardens, and saved from extinction the last small band of the fleet animals in northwestern Wyoming, has continued the

ABNORMAL AND NORMAL

Above, the white antelope whose hair is rougher than that of his orthodox brothers. Left, a yearling with white rump patch expanded

work, and has watched the handful of individuals on the Pitchfork cattle ranch near Cody multiply into a herd of more than 5000. He also has been directly responsible for the wide-spread fame that has come to them. He has lived with them, studied them, photographed every phase of their lives, measured their speed by racing his car behind them at sixty miles an hour across the plains. He also developed the "flying box-car" to insure their safe delivery to zoos from Berlin to Los Angeles.

"This little fellow is not a true albino," Belden explained after a brief visit to the ranch, at which time he studied and photographed it. "The hairless part of its nose is black, as it should be. The only other part that shows any trace of color is a small brown spot on its tail. All the rest of its body coloring differs sharply from accepted antelope form.

"Outstanding among its many physical differences are its eyes, eyelashes and ears. The eyes, instead of being a dark brown, are blue, and the eyelashes are pure white instead of black. The ears are slightly different in shape and are covered with far more hair than is usual.

"The inside of the antelope's mouth is red instead of black, and the general contour of the neck and nose is not as rugged as its range brothers and sisters. Still another difference is its 'danger signal', or rump patch. Anyone who has observed antelope has seen this unique signal in action. It is a patch of white hair over the hips and around the tail. When the animal is at ease the hair lies close to the body and is smooth. But let danger approach and every antelope in sight is warned by a mirror-like reflection flashed across the hills.

"Whenever a pronghorn is frightened the hair on its rump patch stands on end, and, as the animal turns, the sunlight is trapped and reflected with surprising brightness.

"During the two hours that I studied this rare creature at the Sanford ranch it never once 'flashed' and I am inclined to believe that it can not raise the hair. I have no idea what the chances are for a freak like this to be born, but I have studied thousands of them and I have never seen one that could be compared with the Sanfords' pet either in color or delicacy of form."

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Burmese Morning

By MARGARET BAILEY MILES

A bulbul and a barbet in a frangipani tree
Are casting jolly glances at my little son and me.
Bright green is the barbet, with turquoise-ruby crown;
The bulbul's quiet gray reveals one patch of scarlet down.

I think of robins on the lawn, and chickadees in snow,
A cedar-top bent over with the thrush I used to know,
A bluebird in an apple-tree prospecting for a hole,
And in an old New England elm, a flashing oriole.

I think of them with longing, but how can I be sad
With the sunshine all about me and the morning looking glad?
And why should I turn backward when my baby laughs to see
A bulbul and a barbet in a frangipani tree?

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Heavenly Messenger

By LOREN C. COX

IN December, 1880, a metorite fell on the Hanks farm near Quincy, Illinois. The following spring the plow struck it, and in order to get it out of the way, five horses were hitched up and the obstacle was dragged to a small ditch and dumped in. The ditch gradually was filled up, and, although the meteorite was a subject of local tradition, its exact locality was forgotten.

Interested by the stories by boys grown to be old men, who described the flash in the heavens when the meteorite arrived, I was determined to find its resting place. Meteorites have been a hobby of mine for more than forty years, and this one promised to be the best of my finds. Using a radio balance, or metal finder, I finally located the messenger from the heavens.

Dug up and hoisted out, the meteorite proved to weigh 2145 pounds. It was of quartz formation with iron shot all through it. The iron is fused on the exterior, while the balance of the rock has a glassy surface. When found the whole mass was covered with a black deposit, the result of being charred by its passage through the atmosphere.

Most meteorites that have been found are siderites of various sizes, easily recognizable because of their appearance and weight. Some hold that nothing can be classed as meteoric in origin unless it is largely or altogether iron. As a matter of fact, many meteorites whose falls have been observed have proved to be of the stone variety when examined.

MEADOWLARKS AT HOME

By HUGH M. HALLIDAY

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Meadowlarks are among those birds that hesitate to approach their nests when man, or anything related to him, is in the vicinity. To attempt a picture is a challenge; success a triumph. Since these birds nest on the ground it seemed that a small camera, well camouflaged with grass and with ample remote control, should catch the birds off guard. However, they proved to be as much afraid of the concealed camera as they would be of a person in the same vicinity. The closest the parents would come was to a near-by fence, where they sat squawking and scolding until, for fear the eggs would chill, we picked up our equipment and cleared out.

The nest was discovered under construction during the second week of May, but no photographic attempt was made until the five eggs were nearly hatched. The parents at that time are more inclined to submerge their fear in the interests of the arriving family.

New tactics were plainly necessary, so

After feeding the young meadowlarks the parent withdraws and looks around as though to detect any possibilities of danger. Before leaving, however, the bird returns to the nest and carefully cleans it by removing droppings. On the opposite page is a close-up of one of the parents photographed after the blind had been brought closer and closer to the nest, and the camera had been focussed on the spot where the bird usually stopped. Shortly after this picture was taken the young left the nest for good.

three or four days after the young had hatched a portable blind was placed about twenty feet from the nest. After an hour the parents approached and left, seeming to accept the structure as part of the landscape. While they were away, the following morning, the blind was moved a few feet closer, and this was repeated at intervals until it was within working range of the nest. Concealed five or six feet away, we were able to watch the parents attend their young in quite a natural manner, although they were ever on the alert for lurking danger.

At intervals of about fifteen minutes they returned, one usually bringing earthworms, the other a species of snail. They came sometimes singly, sometimes together, one flying directly to the nest, the other alighting a distance away and approaching with much caution. Family life appeared to proceed quite normally until the camera was aimed through a small "window". Then, with a disturbed cry, one of the parents flew off. The other, however, came a few minutes later, feeding the young and cleaning the nest in the usual manner. Attempt to use the camera had disturbed the birds so much that operations were suspended until the following day, when a tripod and lens-shade were brought as additional equipment. The camera was secured to the tripod, then focussed on the approach to the nest with only the lens and sunshade exposed. Pieces of faded green burlap were fastened around the opening in the blind, the sunshade protecting the lens.

The camera was set in readiness and when the birds passed a given point the shutter, which fortunately was comparatively silent, was released. But they soon became suspicious and it was necessary to discontinue operations. Several characteristic pictures had been made, but a close-up was desired, so, the blind left in position, a couple of days were allowed to elapse before a final attempt. The blind was moved forward from the inside until it was within two feet of the nest. The camera was focussed on a point where the birds usually stopped to look around. One parent refused to come near, but the other alighted by the nest and posed in exactly the right place. We were able to change films and snap the shutter twice before it left.

A few minutes later one of the young climbed out of the nest, stretched its wings and made off through the grass. At the next approach of the parent the remaining young raced to meet her several feet away. From then on the nest was deserted; home ties had been broken.

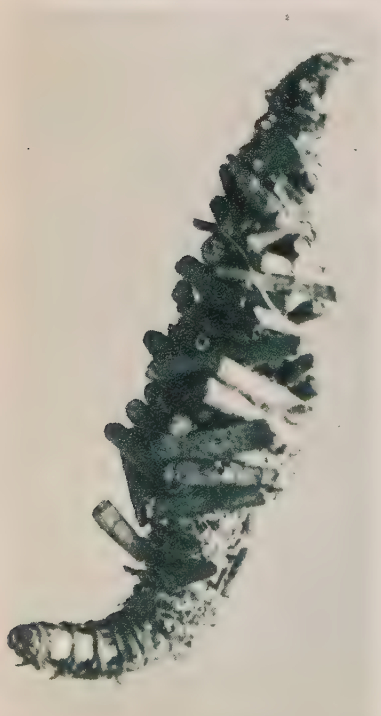
Young were found in the nest on June 2, and at that time they appeared to be two or three days old; they left on June 12.

INSECT BAG MAKERS

Photographs by T. L. Alexander

Members of a large family numbering some 150 known species, the bagworms, or basketworms, are excellent insect architects. The member of the family Psychidae best known and most widely distributed in the United States goes by the impressive Latin name of *Thyridopteryx ephemeraeformis,* but is more easily and usually called bagworm. Although using a wide variety of trees as hosts, in some sections this caterpillar specializes, devoting its attentions, for example, to the arborvitae, a special favorite. On these trees it constructs its tough, silk, pendant bag and covers it with bits of the host tree as camouflage, dooming the tree if its numbers become too great.

In the South the member of the family pictured here, known as *Oiketicus abboti,* is distinguished by its habit of placing short twigs across its bag to make a sort of log cabin. Citrus growers in Florida often find that the caterpillar has attached its bag to ripe fruit by a strong web, eating the while on the fruit.



While these insects differ in some ways among the different species in habits, they have much in common. To select a starting point for the life cycle of the bagworm, we might choose May, when eggs in the bags hatch and active little caterpillars emerge. These start immediately to form little bags for themselves, fastening bits of leaf of the host plant to them. As the worms grow they continue to add to the bags from the bottom. During their growth they close up the mouths of the bag for two days four times, and retire to cast their skins.

Full-grown, the caterpillars become restless, leave the bag and move by crawling, or dropping down, sometimes upon people, by silken threads. The migratory urge exhausted they fasten their cocoons to the twigs of the host plant so that they will remain secure throughout the winter. After the cocoons are well-lined, the caterpillars cast their skins and become chrysalids. The sexes are now distinguishable, the male being about one-half the size of the female. Three weeks afterward, usually in late August or early September, the male chrysalis works its way to the end of the bag and hangs half-way out. The skin bursts and out comes a small moth with black body and glassy wings. His wings dry, he is off to find a mate.

The female is wingless and does not leave her case, laying eggs, stopping the opening and dying.

SAND CREEK EROSIONS

By MARY HONESS

Photographs by Ralph F. Honess

On a beach that the sea left millions of years ago, there is today a weird assemblage of humps and domes. The winds sweeping down from Long's Peak, Colorado, on the crest of the Rockies, have etched a drab array of quaint figures. Their grayish-yellow crests, their red sidewalls and rippled surfaces are suggestive of waters now receded. Winds still whip the loose sands, but not with the velocities that carved the scene one now sees.

That these piles of clay and sand were a welcome refuge to the Indian is evidenced by the number of flint-chips, spear-heads, and hide-scrapers found there today. On a high ledge bordering the plains are pictographs of antelope, of weapons and of Indian warriors. There are legends that tell of buffalo herds, caught grazing on the plateau above the erosions, being stampeded to their deaths over the embankments by Indian riders. In this way the tribe's seasonal supply of meat and hides was quickly obtained.

The many recesses today are hiding places for small mammals—deer-mice, pack rats and cottontail rabbits. Hawks nest on the highest pinnacles; swallows and swifts nest in the shelter of the cliffs.

Several miles back on the peneplane there is a tall pillar, Camel Rock, atop which there is the likeness of a camel at rest, while the face of the driver perpetually looks upon this wind-whipped, sun-baked confusion. The sand and gravel of this pillar were once part of a mountain range that stood a little west of the present Rocky Mountains.

These wind erosions are about twenty-two miles southwest of Laramie, Wyoming, on the Sand Creek Pass Road near the Wyoming-Colorado state line.

A mammoth monument carved by Nature. A sitting camel rests atop this eroded pile. Below are more fantastic carvings that inspire the imagination and interest the geologist. On the preceding page are pictured crannies that form the homes of many small mammals, and one rocky pinnacle that has been chosen by a hawk for a nest site.

The black swan of Australia is a striking bird, although smaller than the white mute swan. It has its place on the arms of its country and on one of its stamps, and is the official emblem of Western Australia. It was the first Australian bird to become known to the white man.

SWANS

By ARTHUR H. FISHER

Photographs by the Author

Swans have won the admiration of man since early times, and it is not strange, therefore, that the common species of Europe was used as an ornamental bird centuries ago. When North America was settled two species were found common here. As man spread his influence, these great birds, most of which were forced to spend their winters in the South, suffered severely. Today the whistling swan, which nests in the far North, is reduced to a few thousand individuals. Although it is now unlawful to kill wild swans anywhere, constant vigilance is required to protect them.

The trumpeter swan, the larger of the two, used to nest commonly in the northern and higher parts of our West, and also in Canada. For a number of years its range has been restricted to two relatively small areas, in the region of Yellowstone Park, and in British Columbia. These birds, aggregating only a few hundred individuals, do not attempt to leave their breeding areas. The utmost care is exercised in their protection, and it is hoped that they may survive and increase.

The average individual, of course, thinks of swans in terms of the graceful and beautiful white or mute swan of Europe. For that reason the black swan of Australia and Tasmania is all the more startling, and, indeed, it was thought for centuries to be an impossibility. In January, 1697, the Dutch explorer, Willem de Vlamingh, captured some of these birds at the mouth of what is known as the Swan River and took them to Batavia. A year later a report of them reached England through the burgomaster of Amsterdam, and the facts were published by the Royal Society.

Today this swan, with its soot-black plumage, pure

The striking black-necked swans of South America and the white or mute swan of Europe provide interesting contrast in any location where they are found together in captivity.

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white quill feathers, and coral-red bill, is relatively common in zoological parks and elsewhere where swans are kept for ornamental reasons. The cygnets are white and closely similar to the youngsters of the mute swan.

Almost equally spectacular, but not as frequently seen, is the black-necked swan of South America. Although lacking the size and majestic dignity of the Old World swan, these birds are outstanding in beauty. They are most abundant on the pampas of Buenos Aires, but their range extends to Patagonia and to the Straits of Magellan and the Falkland Islands. They are usually found in small flocks, but now and then congregate in considerable numbers.

In July, just after the winter solstice, they nest in the deep rushes, building their nests up from the bottom of the marsh to a height of four or five feet. The tops, some two feet in diameter, rise about a foot above the water. The birds approach and leave their nests by swimming, and, like other swans, carry their young on their backs. They lay three to five glossy white eggs.

As We See It

FISH AND WILDLIFE SERVICE

As of June 30, 1940, the United States Bureau of Biological Survey and United States Bureau of Fisheries, transferred respectively from the Department of Agriculture and the Department of Commerce under reorganization plans, were consolidated. The new agency is now known as the Fish and Wildlife Service of the Department of the Interior, a descriptive, if not, to our mind, particularly happy choice of title.

Under the consolidation, Dr. Ira N. Gabrielson, who headed the Biological Survey, will continue as Director of the new Service. Charles E. Jackson, who was acting Commissioner of Fisheries, and Walter C. Henderson, who was Associate Chief of the Biological Survey, will be assistant directors concerned with activities within their respective experiences.

Sentimentally, some will regret the passing of the old agencies and designations, but there is ample logic for the consolidation of the work, now that both organizations are in the same Federal department. There is no question but there was much overlapping of interests, and that greater efficiency and better employment of facilities should result from the joining of these two forces concerned with our wildlife resources.

In most States the fish and game administrations are in one department, and it is held that State agencies will find it much easier to cooperate with one Federal bureau than with two. So, also, will private organizations whose members are interested in wildlife.

It would seem that the fisheries work would benefit most from this consolidation. The system of wildlife refuges built up—and still building—under the Biological Survey has important significance from the point of view of fish production. Enforcement work should benefit from the combination of field personnel, and field studies of such matters as waterfowl numbers and fish restocking needs should be aided. Under prevailing conditions, therefore, it appears to be an altogether wise move and a commonsense arrangement.

Those who may regret the nominal passing of the two bureaus may take solace in the fact that neither agency could truly be said to be placing major emphasis on work in accordance with the original conceptions that brought about their creation. Both bureaus were established to carry on scientific studies; to assemble factual data on the distribution, habits, and populations of the organisms concerned, and to present this information as a guide to legislation and administration. Gradually these scientific functions—although still a part of both agencies' activities—gave way in importance to administrative functions.

The Bureau of Biological Survey, which now loses its name but not its functions, began its work on July 1, 1885, in a very humble way. A committee of the American Ornithologists' Union, appointed to study the migration and distribution of North American birds, instructed its chairman to prepare a memorial to Congress seeking the pecuniary help needed. The result was an appropriation of $5000 to carry on the work. The committee of the Union endorsed the chairman of the committee, Dr. C. Hart Merriam of New York, for appointment as director of the work, and he took charge on July 1 of the same year.

At first the new agency, called the Division of Economic Ornithology and Mammalogy, was a branch of the Division of Entomology. The next year, however, with its funds increased to $10,000, the Division became independent. Thereafter annual appropriations gradually increased, with the expansion of the work, to $15,000 in 1890; $27,500 in 1900; $87,420 in 1910; $809,082 in 1920 and $1,035,020 in 1928.

Among the legislative acts that were administered by the Biological Survey during this period, three were especially outstanding.

The Lacey Act, the first of these, owes its origin in part to efforts in Boston, Massachusetts, to destroy the English sparrows on the Common. This bird, first imported in numbers near New York City about forty years earlier, had become so abundant in the historic public park as practically to crowd out the native birds that had formerly adorned it. A local society interested in our native birds had succeeded in starting a public movement to suppress the bird, but the humanitarian societies had been able to halt the operations. The episode, however, called public attention to an extensive treatise on the sparrow that the Survey had published, and, in combination with other movements to benefit our wild birds, resulted in the pas-

sage of what is generally known as the Lacey Act. It was aimed to improve the status of game and other wild birds, to suppress hunting for market and the killing of birds for plumage, and to exclude from introduction all undesirable exotic birds and animals. It thus tended to stop several practices that were recognized as endangering our wildlife. By making it illegal to transport forbidden products across state lines, what was virtually national control over these products was gained. At about this time, and partly as a result of this Act, the establishment of bird reservations got under way. This activity has now grown to large proportions, and is very important in the Bureau's work.

In the summer of 1915 an outbreak of rabies among coyotes in eastern Oregon and northern Nevada gave rise to extensive poisoning and trapping campaigns against predatory animals, which have continued to the present. Poisoning operations against various rodents, which had already been started, received a great impetus at this time. In time, through the efforts of the sheep and cattle interests in various western states, large sums were collected and turned over to the Survey for expenditure. The men who trapped, shot and poisoned the animals were paid salaries, were obliged to report and to turn in the skins or scalps of all animals taken, and could accept no bounties or other monetary favors. Salable skins taken were sold for the benefit of the United States. The principal animals sought were wolves, coyotes, wildcats, and mountain lions or cougars. During the early days of the poisoning and trapping operations large numbers of animals, other than those particularly sought (the numbers never reported) including badgers, predatory principally on rodents, fell victims. Foxes, practically guiltless as to domestic stock, and also rodent-killers, were killed. Furthermore, the coyote, although leading all others in numbers killed, seems able to hold its own against all efforts, and has even extended its range in some places.

The use on a wholesale scale of these control measures, and especially of poison, which has been proved to result in the death of many innocent birds and mammals, and even of livestock in some cases, has met with opposition from large numbers of naturalists, and from fur-trappers, and many ranchers and humane workers.

In many respects the most important work done by the Biological Survey has been the administration of the Migratory Bird Treaty Act, probably the most notable and meritorious bird-protective legislation ever enacted by any nation. It gives effect to an international treaty, and is supplemented by the Migratory Birds Convention Act of Canada. This far-reaching piece of legislation had its beginning in 1904, when a bill for the protection of migratory birds was presented and introduced by George Shiras, a representative from Pennsylvania. It did not pass, but interested discussion kept the movement alive, and in 1913, its virtual counterpart, the Weeks-McLean bill, became law. Its first appropriation became effective on June 30, 1914.

Since most of our migratory game birds are raised in Canada and winter in the United States, it was realized that an international treaty that recognized their need for protection was desirable to give force to the necessary laws. After prolonged discussion between the two countries, during which the extensive records and investigations of the Biological Survey helped most effectively, the treaty was ratified in 1916.

The Acts that give effect to this treaty are, for the United States, the Migratory Bird Treaty Act of 1918, and for Canada, the Migratory Birds Convention Act of 1917.

In the United States the constitutionality of the Act was contested, first shortly after its passage in 1918, but the courts decided in its favor. It will surprise many to learn that efforts to defeat this act have not yet ceased, and that some of its attackers proclaim themselves to be conservationists. In a few cases money raised for "conservation" purposes from private individuals has been used in efforts to block enforcement of it. But, so far, no such effort has succeeded.

Like the Biological Survey, the Bureau of Fisheries was based on the need for scientific data to guide its activities, and, with a few exceptions, it has been directed by scientific men. It was established and first directed by Spencer F. Baird, one of the foremost of American naturalists (who was its head from 1871 to 1877), for the propagation and distribution of useful fishes, crustaceans and shellfish. A large number of the foremost American students of these subjects have been associated with it through the years. The exigencies of administration have resulted in the addition to its charges of other forms of life, mainly marine creatures, and thus certain seals, sea-otters, whales, polar bears, and even reindeer came to be administered by it, besides sea-weeds and their derivatives, turtles, crawfish, sponges, and other organisms. Scientists of other countries have cooperated in various cases, especially when marine groups of animals were involved.

The tremendous value of the commercial marine fisheries and the industries dependent on angling early resulted in an infusion of politics into its administrative functions, and this in some cases has resulted injuriously to the resources themselves, and to the public. Examples are the introduction of certain fishes in the normal habitats of others without sufficient study, and the present tendency to subordinate many other considerations to the encouragement of angling, which results in some cases in serious derangement of natural associations.

One of the most notable instances known of the increase and national protection of a great natural resource has been the recovery and building up of the great herds of fur seals that breed on the Pribilof Islands in Bering Sea by treaties with England, Japan and Russia. The killing of seals at sea, which resulted in the death of their helpless young, was thus outlawed.

There seems little reason, in fact, to shed tears over the passing of bureau names. Times, fish and wildlife populations and popular pressure changed, and the two agencies now merged changed with them. So now we have the Fish and Wildlife Service, and we wish Dr. Gabrielson and his assistant directors well in their conduct of the combined activity. They have in their charge some of our most invaluable resources.

The Ring-necks Move East

By HOWARD L. MENDALL

FOR HUNDREDS of generations the ring-necked duck dwelt peacefully in the midwestern agricultural district of North America. It was a common summer resident in the most famous of all waterfowl breeding areas, Alberta, Saskatchewan and Manitoba, extending into the United States chiefly in the Dakotas and Minnesota. It is a typical diving duck of the great plains country, and its close associates are the scaups, redheads and canvasbacks.

There is nothing spectacular about the early history of the ring-necks. Each spring they fought their way north through the dangerous Mississippi Valley, facing a barrage of spring gunners. Each fall they ran the gauntlet again on the southward flight, both in the Mississippi and the Atlantic coastal regions, since many of the birds crossed the eastern half of the United States before proceeding south. In summer they raised what few young were permissible in view of floods, droughts, fires and predators. In winter they busied themselves basking in the southern sunshine and dodging pothunters.

Such was the existence of the ring-necks. They had good years and poor years, but the population had never quite balanced since the coming of the white man and the start of the great duck decline. In time, conservation measures were initiated—spring shooting was banned and bag limits were established—but these restrictions halted only temporarily the gradual, continuous downward progress. By the end of the first quarter of the twentieth century, the future of waterfowl had been definitely reduced to a basis of "survival of the fittest". The Labrador duck had been driven long before to complete extinction; the trumpeter swan remained only in a few isolated spots; two species of geese were clinging precariously to the ragged edge of nothing; the wood duck, most beautiful of all our waterfowl, had gone on the Federal relief roll of permanent protection.

Through all this disaster, the midwestern divers had fared comparatively well, but suddenly, out of a clear sky, the walls of their universe collapsed. The far-reaching business depression of the United States coincided almost exactly with a crash for the ducks. The land of the midwest had refused to take further punishment. Stripped of water-retaining cover, the topsoil had been swept away by floods, and the eroded land could no longer hold the annual spring run off. The shallow lakes, sloughs and pot holes dried up. Droughts such as had never struck this region left nothing but dried mud in the breeding areas. The water-filled habitats of May were reduced to burning deserts just in time to greet the July broods, and the young ducklings cried in vain for moisture.

NEST OF THE RING-NECKED DUCK

Note the lack of down with the partial set of eggs. Even in advanced stages of incubation the lack of much down is a characteristic of these birds

Succeeding years were nearly as disastrous, and by 1933 all waterfowl populations were at an alarmingly low ebb. One by one, the individual species met with defeat. The Canadian and the United States Governments tried to assist, for realization came that human beings were not the only inhabitants whose homes had been destroyed by drought. The temporarily-protected list swelled as the eastern brant, ruddy, canvasback, redhead and bufflehead took their places beside the wood duck, trumpeter swan, and others. A Federal refuge system of vast proportions was set up, but results were slow, for no refuge can be effective without ducks, and the great Canadian waterfowl incubator was moving at its slowest pace in history.

If the ring-necked ducks felt that they had been slighted at being left off the protected list, they could not have been blamed for this attitude for, after all, a large part of their habitat had been all but destroyed, and their numbers were greatly reduced.

At any rate, in some way the birds must have decided to extend their nesting range. Of course, this had been

tried before by some species and it had not worked. The redheads, canvasbacks and ruddies, as well as others, had tried to move away from the drought, and a few ring-necks may have tagged along. But these creatures of habit had gone only a few hundred miles. This time, however, the ring-necks were really determined to travel.

Horace Greeley once advised, "Go West, young man". Some old grand-daddy ring-neck must have reversed the order and said, "Go East, young duck". Gradually the idea seemed to gain headway. No one knows the exact process by which the tiny breeding population of ring-necks in our northeast grew to the numbers that now bid fair to become a factor in ring-neck restoration—if we treat them right.

Besides the ring-necks that raised their young in the region that drainage and drought conspired to wipe out as a main stronghold, there had long been an active minority that nested in the forested (and therefore droughtless) region north of the plains. Some factor, however, kept them from extending their nesting range into northern Canada, where the related scaups still find room for millions. They might still have found homes within their former range in wooded country. Since we cannot know just what was the deciding factor, perhaps we are justified in some flight of fancy in accounting for the present conditions. Perhaps by tagging along with other ducks that were going to Labrador some ring-necks had learned of a promised land to the north, with numerous forest-fringed lakes, in a region where comparative safety from predators and hunters was the rule, and where drought was a negligible factor. Let us not forget, also, that away back in the days before the automobile came, and ornithologists were less migratory, a few ring-necks had been found in Maine in summer, and were suspected to be nesting.

RING-NECKED DUCK HABITAT IN AROOSTOOK COUNTY, MAINE
The nesting site in this picture is on the boggy island in the left center. In the foreground are bullrushes, pickerel weed and watershield

One February, a few years ago, as the Canada geese along the Atlantic coast made preparations for the northward journey that always keeps such a close pace with retreating winter, a few flocks of ring-necks mingled with them. For many days the huge mass of waterfowl restlessly awaited the call to start. Then came the morning in early March when the leaders, with visions of far-famed Merrymeeting Bay before them, gave the jubilant command to fly. Swiftly the long, gray columns swept northward, a few moving inland to go up the Hudson Valley route, a few cutting diagonally across the country toward the Lake States, but with the majority following the coast. The leaders paused briefly, snatching only hurried lunches, until they reached the expansive shallow feeding waters of Merrymeeting Bay near the mouth of Maine's Kennebec River. Here, the birds were to spend from two to four weeks resting, feeding and waiting for the northern rivers and streams to clear of ice, when they would move on again, not in masses this time but in small flocks, each with its own leader.

The geese descended on Merrymeeting Bay by the tens of thousands, eager to feast at this most famous of northern concentration areas. The annual corps of human visitors was there to greet them, to count them, to band them, and to study them. But these observers entirely missed the ring-necks that had trailed the geese for a thousand miles. The ducks were now feeling the mental prods of minds that were wondering how such an unusual adventure would turn out. Already they were real explorers. They had seen a shoal, sandy coastline change to a tide-worn wall of jagged rocks that warned of unknown dangers; the tiny pot holes and open sloughs of their own Mississippi Valley were replaced by the large forest-sheltered lakes of New England; the pines of the southern coast had given way to the spruce covered islands of the north. It is not surprising that the birds were keeping to the sheltered coves and nearby streams rather than the broad expanses of the bay. They were afraid, yet they dared not turn back. They kept their guides in constant surveillance and anxiously awaited this next flight, which, they understood, would carry them on to the breeding areas as rapidly as the northern ice-bound waters opened.

The geese were in no hurry to move and the ring-necks continued to mark time. Already the blacks and the golden-eyes were pairing off and, two by two, they slipped quietly away up the streams. A few wood ducks, teals and mallards came in from time to time, but most of these birds were paired, and lingered merely a day or two. Still the majority of the geese remained; only a scattered few had pushed on and their places had been filled by late arrivals from the south. The ring-necks mated eventually, here in the shadows of the Kennebec Valley, under strange surroundings, scarcely daring to hope that their goal would be

reached. Some were tempted to give up the journey, to turn back and seek nesting sites where they could, or to follow the blacks and golden-eyes and nest on the banks of the little streams of central Maine. But the words of the old grand-daddy still lingered in their memories and they put aside these temptations.

One morning in mid-April, the ducks were awakened at dawn by the cries of the geese. They were the flight calls, honks they have long been called, an indescribable bedlam of sounds resembling trumpets, bugles, and the confused jargon of a poultry yard. All day their leaders were frantically segregating them into small, easily-managed units of twenty-five, fifty or a hundred—rarely larger. The evening meal at low tide was hurried, for the flocks were ready to move. The ring-necks said farewell to their friends, took their mates and swam slowly and anxiously in wide circles, in readiness. They had decided to spread out; not more than two or three pairs would travel together.

A mellow, creamy moon floated over the eastern shore of Merrymeeting Bay. The incoming tide was covering the mud flats. Only the faintest of breezes rustled the dried rice stalks and turned the pathway of the moon into a shimmering mirror of silver. A momentary stillness permeated everything, to be broken by the triumphant notes from forty thousand geese. The flight to the breeding grounds was on!

The wedge-shaped, speeding columns of geese, seen by day and heard by night, moved onward, spreading out through the entire northern half of Maine. No matter what flight lane the various groups took, a few ring-necks were always close behind. As a flock of geese flew low over Moosehead Lake, a pair of the ducks dropped down, too frightened to go farther. A heavy flight of geese, bound for Labrador, proceeded along the eastern coast of Maine, and another pair of tired ring-necks was left on a forested lake in Washington County. But the majority of the birds, although terrified by the unknown, kept on. Then, at the height of their discouragement, they found haven. Strangers though they were, there was no mistaking the vast potato empire of Aroostook. Joyfully the ducks spread out on a chain of lakes that marks the boundary between agriculture and forestry, and gave thanks for a safe journey. Likewise, those that had gone into New Brunswick settled on the lakes and streams of the St. John Valley. They were tired and wing-weary but happy, for the swamp-bordered lakelets were not unlike the ponds of central Alberta, where some of them had first seen the light.

Fortune, sometimes so fickle and disappointing, was kind to the ring-necks. The Aroostook and New Brunswick birds reared large and successful broods that first year, and even those that had given up a few miles short of their goal raised a small number of young. The fall migration was carried out without serious losses and the winter found less persecution than usual. With the coming of March the ducks were ready, even eager, to travel north again. They were beginning to like their new nurseries.

For two more years the ring-necks prospered in their new homes and no human being ever suspected the fact. Each spring saw larger numbers of the birds moving northward, however, and it was inevitable that their nesting places should be detected; in 1936, a family of young ducks was found.

In 1937, scientists commenced to make comprehensive studies of waterfowl areas in Maine and the Maritime Provinces, and when they compared notes they discovered an abundance of ring-neck broods that was little short of miraculous. Then the ornithologists, their curiosity thoroughly aroused, went by airplane, canoe, motorboat and afoot in search of the nesting grounds. Observers were posted on the flight lanes during the spring migration of 1938 and the ring-necks were followed right to their breeding grounds. Early in June, on a floating island in an Aroostook marsh, man gazed upon, thrilled at, and photographed the first nest of the ring-necked duck to be found east of Michigan.

A YOUNG RING-NECKED DUCK

This youngster is only two days old and one of those destined to swell the numbers of his species in the East

To ornithologists the natural extension of a bird's range is always of interest, and it is seldom that the details are so well known as in this case. Its outcome is sure to be watched with great interest. Unfortunately, the opposite condition, a lessened nesting area, is the more usual phenomenon, for we are careless of our blessings.

The secret of the ring-necks' new home is out now, but the ducks do not care. They have successfully established themselves more than a thousand miles from their ancestral swamps, and they are satisfied. They are increasing in numbers yearly. Up in Aroostook's best waterfowl marsh, where today the ring-neck is the lake's most abundant duck, there is a shrine of potamogeton and white waterlily, crowned with water-shield and other duck delicacies, erected in honor of the old grand-daddy whose courage and foresight helped to save his race. And if that adventurer were alive today his one wish would be that northern Maine and New Brunswick—and the gunners of the East—continue to be kind to these daring pioneers of the duck world. We hope they do not learn of this colony.

Things to Think About

At a regular meeting of the California State Audubon Societies, held April 25, 1940, it was unanimously resolved that "according to reliable observations over a period of years in Arizona and southern California, the western white-winged dove is becoming scarcer each and every year and nearing the danger mark of extinction, and whereas, to prevent it from joining the list of extinct or extremely rare avifauna, be it resolved that we recommend a closed season of at least two or three years be placed upon the western white-winged dove." Copies of this resolution were sent to Mr. Ickes, Secretary of the Interior, and to Mr. Gabrielson, Chief of the Bureau of Biological Survey.

It has been our observation that interested persons over a period of several years have called attention to the dire need of protection for this bird. Hunting has continued, however, in the face of growing scarcity of the birds. It is increasingly apparent that, unless this species is afforded more protection, it is bound to lose its place in our fauna, or at least to become extremely rare. This result, merely to allow a few gunners to pursue to its death a beautiful and harmless species, would be unworthy of agencies that flood the country with press releases lauding their own solicitude for its wildlife.

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After a period of quiet investigation, a dragnet was sprung around 110 wild-duck bootleggers in Tennessee, Arkansas and Mississippi, against whom fines of more than $4500 and 280 days in jail were assessed. In Tennessee a ring of wildfowl dealers, from hunters and sellers to commission merchants, was broken up.

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Opportunities for the Preparation of Teachers in Conservation Education is the title of Pamphlet No. 90 of the United States Office of Education. It is a compilation of educational institutions offering courses in conservation education. It was found that 138 such schools, colleges or universities provide the courses in 35 of the States.

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Building a constructive conservation viewpoint among the members of the rising generation is an important activity if we are to turn over what is left of our natural resources to them with confidence. Every now and then, however, destructive conservation ideas gain support among organized youth to a disturbing extent. One fine group is comprised of the Future Farmers of America, boys and girls who, by virtue of their rural location, will be specially close to our wildlife. They have an opportunity to lead in conservation.

However, dangers arise when such a group dedicates itself, as it has done extensively in Texas, to a program of "pest control". Such campaigns are inspired by an unfortunate misunderstanding, or lack of knowledge, of the whole subject. Indiscriminate campaigns are launched against hawks and owls, ignoring the now general recognition, even among sportsmen, that the majority of these species are beneficial. Other so-called predators are the object of vendettas with utter disregard for scientific justification for such control. Any predator control activity should be based upon conclusive scientific evidence and practiced by trained personnel under competent supervision. Furthermore, killing campaigns are no way to teach young people conservation.

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From Georgia a reader sends us a clipping from the *Atlanta Constitution* of a brief story bearing the date line Lawrenceville, Georgia, May 25, and the headline—"Bald Eagle Killed in Lawrenceville." The story relates that "a bald eagle carrying a three-pound bass was shot down by Dr. Harper at his fish pond near here. The eagle, which had a wing spread of five feet, seven inches, was exhibited in the courthouse yard."

Dr. Harper's lethal attack upon the National Bird came just in time so far as Dr. Harper is concerned. On May 27 the United States passed, and sent to the White House for signature, a law extending protection to the bald eagle. To kill or to have in possession one of these great birds now makes one liable to a five-hundred-dollar fine. At long last this persecuted and now relatively rare bird—our nation's emblem—has been given the legal recognition to which it is entitled.

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Last spring we heard numerous reports of extensive waterfowl starvation during the severe winter. Most of these originated among those seeking to break down the prohibition of the use of bait as a lure to waterfowl for the purposes of shooting. Careful scientific investigation failed to prove the least justification for these claims of wholesale loss from lack of food. The Biological Survey conducted studies in the Illinois River Valley, and one study of 41 supposedly starved birds is typical of other similar investigations. Of these 41 birds twenty had died of lead poisoning; eight were heavily infested with internal parasites; three were suffering from gunshot wounds at the time of death; of the remaining ten, seven had a considerable amount of corn, small grain and other food in their gizzards, thus eliminating starvation as the cause of death.

"The apparently increased rate of mortality from lead poisoning, however," reports the Biological Survey, "pre-

sents a real threat to the waterfowl population. Reports from many parts of the country indicate that lead poisoning is the cause of death of about 50 percent of the ducks picked up in sections where starvation was originally suspected. Lead pellets, by paralyzing the digestive tract, affect old and young, healthy and unhealthy ducks alike. Ordinarily conditions are usually bad in marshes where blinds have been located in the same position for many years.

"The pellets remain in the marshes and are taken by the birds in their search for food or gravel used in grinding food in the gizzard. The prohibition of baiting in recent years has relieved this condition somewhat, since the waterfowl are now not unduly attracted by grain to such restricted areas where shot has accumulated over a long period."

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One who describes himself as "a lover of all wild creatures" sends us what he entitles "The Sportsmen's Creed", and we print it here in the hope that it will inspire comment, whether pro or con. There are those who will regard it as harsh, unfair and intolerant; others will subscribe to its sentiments most heartily. So we invite comment or criticism of "The Sportsmen's Creed":

"We are the only real conservationists for without us no conservation would be necessary. Killing is our pleasure but the stock of creatures to kill unfortunately ever dwindles. So that it will not disappear too quickly, we tax ourselves a little and hire wardens to umpire but not to interfere with our program of legalized extermination. By our license fee system, we make wildlife pay for its own salvation, for every hour of delay in its extirpation. The whole thing is in our hands; we play with wildlife as a cat does with a mouse; we slay here and reprieve there, we kill by the clock or the calendar; but we kill, we always have killed, and so long as there is anything to kill we shall continue to kill. We make the opportunity for conservation, we control it; whatever it is or whatever it may be, it is ours. From the beginning unto the end, we are the only real conservationists."

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Acquisition of 48,502 acres, at a cost of $349,466, to be added to twenty existing wildlife refuges administered by the Biological Survey has been approved. The largest addition was 20,323 acres, enlarging the Hart Mountain Antelope Refuge in Oregon. These additions bring the acreage in such refuges to more than 13,500,000 acres in 266 refuges. The system includes 144 refuges for waterfowl; 63 for other migratory birds; 18 for wildlife in general; 29 for non-game birds; 12 for big game.

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Wayfaring Thoughts

By OSCAR OSTLUND

THERAPY in Nature works by a process of suggestion. The energy on the luminescent rhododendron leaves is manifest, and the courage of small white pines forging up through the brush is contagious. When a warm rain frees the forest from the heavy chains of sleet, and when the snow melts on the lighted mountain roof, we can hear a throb of life in the sun's vascular system. The rhythmic drip of water from the eaves is like the pulse beat of a strong heart. And the spring, which has been dry, flows full with no impediment of speech in its tongue of free, clear water purling over pebbles.

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That which uplifts the spirit has power to hold the Universe in order.

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A wayward wind, blowing in September, stirs up a bubbling composition of color on the hill. Tossing in the wind, a flock of ferns, russet, yellow and green, expound the poetry of physics. In a swirling dance they render homage to the air, compliment the sun, and openly absorb its power. Who would feel drowsy in a pew of worship if it looked out on a congregation of ferns?

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Nature is a sun worshipper. The flower and the warbler show a reverence for light, more apparent in the Book of John than it is in the creeds of later theologians. In modern civilization, a spiritual equivalent of the daisy does not find a high field on which to blossom.

As man elevates himself by inventions, by airplanes and by towers of industry he seems inclined to lose sight of plant life, which predates him in time. The blue chicory, for example, which has lived longer than man, closer to the earth and more attentive to the sky, has opened its eyes to things that busy people forget—the fundamental sunlight and the unpolluted leaf-conditioned air.

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Truth in Nature is never cut and dried, or isolated or fragmentary. If we catch the essence of the flower's text, it will accord with that of the clean pebble in the stream and with the fossil leaf in the coal bed. And the ultimate composition—the correlated truth—will stand up finally under scrutiny in the facetted light of heaven.

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The hallmark of scenery in the backwoods is its unassuming beauty. No vanity is visible in a wagon road that has not been driven on for twenty years; no ostentation or labored effects. The unfashioned forest never begs for admiration. It has no formal elegance to push forward as we see it in some richly-tailored landscapes.

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A showy mansion in the backwoods looks outlandish. The affectation is exposed by native exemplars of taste—the impressible white pine, the versatile hemlock, and the unimpeachable oak. Any vacant hut, on the other hand, has good endorsements if the sun speaks well for it, and if hemlocks reach out to it with affection.

SNOWDROPS PROVIDE A GARDEN THRILL WHEREVER FOUND
Galanthus nivalis photographed in our Garden Editor's garden on April 13, 1940, almost 60 days behind their usual appearance

Hardy Pygmies of the Garden

By ADOLPH KRUHM

When Gulliver awoke in Lilliput he had the surprise of his life. He had not the faintest idea that there were so many pixies. And so it is with gardeners, who so often look for big things—the biggest dahlias, irises, petunias, or any other flower that puts on a show. To those who love every type of plant life, however, the little fellows are just as interesting as the giants. Let us have a look at some of the Lilliputians of the flower world—plants that are easily grown from bulbs, and that should be planted within the next few months.

The bravest of the pygmy flowers are the snowdrops, called *Galanthus* by our botanists. On Long Island, New York, they generally rear their heads through late February snows. This past season, however, they did not perform quite so early. As a matter of fact the spring of 1940 will go down in history as the most extraordinary in a quarter century in many parts of the country. Unusually severe temperatures during late January and throughout February did their utmost to upset the programs of some forms of plant life. As a result we witnessed many unusual spectacles. Snowdrops, crocuses, Christmas roses and heather bloomed simultaneously on April 13.

Snowdrops delight us with their daintiness. While they look as fragile as Dresden china dolls, they are as sturdy as any flowers I know. The bulbs from which they grow average less than half-an-inch in diameter, and they should not be planted more than an inch deep. If your soil is light, and the garden situation is such as to cause alternate freezing and thawing, the spot where you plant them should be mulched. After the ground freezes hard it should be covered with peat moss or coarse manure.

Two forms of snowdrops delight flower lovers. The best known and most popular is the single type offered as *Galanthus nivalis*. A larger flowering variety of this is called *Galanthus elwesi*. The double form blooms slightly later. A Dutch grower, some years ago, told me a story about the origin of these double snowdrops. He said that if you do not disturb the single *G. nivalis* where they have become naturalized they will ultimately become double. During the last twenty years they have never done this in our garden, but maybe our soil is too poor to encourage a snowdrop to act that way.

Snowdrops have a competitor called spring snowflake, *Leucojum vernum*. It grows about twice as tall and its flowers are much larger. It also has dainty, nodding, white flowers tipped with green, but it is more exacting in its soil requirements than the snowdrops. It must have a well-drained spot, rich soil and a sunny situation. Unless you can find this combination in your garden, snowflakes will die as they have with us, year after year.

"GLORY OF THE SNOW", OR CHIONODOXA

These lovely tenants of the rockery combine blue and white. They do not, however, multiply as fast as do snowdrops and scillas, so our editor's wife refuses to let him have them for boutonnières

Both snowdrops and snowflakes should be considered as accessories to the garden border rather than as individual attractions. They charm by their daintiness when planted near evergreen hardy azaleas, heather, or other shrubs of evergreen character. These little bulbous plants present only one permanent problem. Their tendency is to multiply too rapidly. Within four or five years the clumps are apt to choke. The flowers become smaller and smaller, and when that happens the clumps have to be lifted, divided and replanted. The best time to do this is after the foliage matures.

Our garden show is now adorned with crocuses. Last fall I wrote about them and described the surprise they held in store for us in the free and peaceful Netherlands of the spring of 1937. The crocuses we saw in Haarlem measured all of five inches across, and were as large as some of the early tulips. There was Purpurea Grandiflora, the largest of them all; the Bishop, a dark purple; and Paulus Potter, a violet blue. You may have this lovely spring visitor in all kinds of robes, including striped ones.

These flowers have an interesting history. Old herbals tell us that their orange-yellow stigmas were dried and used in making medicine. To this day, Persians and Spaniards use them as a flavoring in rice. Vernon Quinn, in *Stories and Legends of Garden Flowers,* reports that old Zephyrus, the Greek god of spring airs, saw a youth called Crocus who was in love with a young shepherdess. "Zeph" wanted her for himself, and in order to get rid of the youth he changed him into a flower. The girl, however, would have none of the windy Zephyrus, so he turned her into the sticky shrub called yew.

GRAPE HYACINTH

One of their greatest charms is their habit of continuing to bloom long after others of the spring pygmies have gone

Scillas, or the so-called Siberian "squill", lift their small, drooping flowers above the soil along with the snowdrops in the spring. They may not create the thrill we get out of finding snowdrops, but they bring us the bright blue our hearts pine for after a long, dreary winter. Their short, bell-like flowers are small, borne on stems three to four inches tall. There is one variety called "spring beauty," which grows a little taller to better display its clearer blue. It bears five to six flowers from every bulb and deserves a

place in every rockery.

When the snowdrops and scillas are at their best, and crocuses are passing out, our chionodoxas arrive. "Glory of the Snow" is misnamed, because snowdrops beat it in all but color. In that respect it beats the scilla, however, for the chionodoxa combines both blue and white. I am permitted snowdrops for a boutonnière, as well as scillas. But when it comes to chionodoxas my wife says, "No!" She points out that they do not multiply as do both snowdrops and scillas.

The so-called grape hyacinths, *Muscari,* are among our proudest garden possessions. We appreciate most the fact that they bloom successively for weeks. The new generation of bulblets provides a continuation of blue, baby-shaped flowers in clusters for weeks after our scillas, crocuses, snowdrops and other spring flowers are gone. Among all the grape hyacinths we like blue-eyed *M. botryoides* best. It blooms at the same time as the early daffodils, and it has a pure white as well as light rose-eyed sister. Heavenly Blue owns the choicest spot in our rock gardens.

These are the more important hardy pygmy folk grown from bulbs in our gardens. The bulb planting season is really just around the corner. While most of those mentioned belong in the rock garden, it actually matters little where we meet them; even the most sophisticated gardener gets a "kick" out of coming face to face with them, for they brave icy weather and endure, thus proving that spring is on its way.

The beauty of these little harbingers of spring is enhanced by the thought that they are constant visitors. They neither call for any "fussing" about them, nor do they make great demands for fertile soil, protected situations or what not. They just enjoy being left alone to thrive and come back to make each recurring spring a new delight.

All of which brings me to the point of proclaiming them faithful and inexpensive servants to those who can offer permanent quarters to pygmies. It is only fair to say that the first investment in this tribe may call for a liberal part of the garden budget. But it is also true that this investment will bear dividends for years to come. Also, ambitious gardeners can multiply this investment by judicious garden work.

PHOTOGRAPH BY E. MEERKAMPER

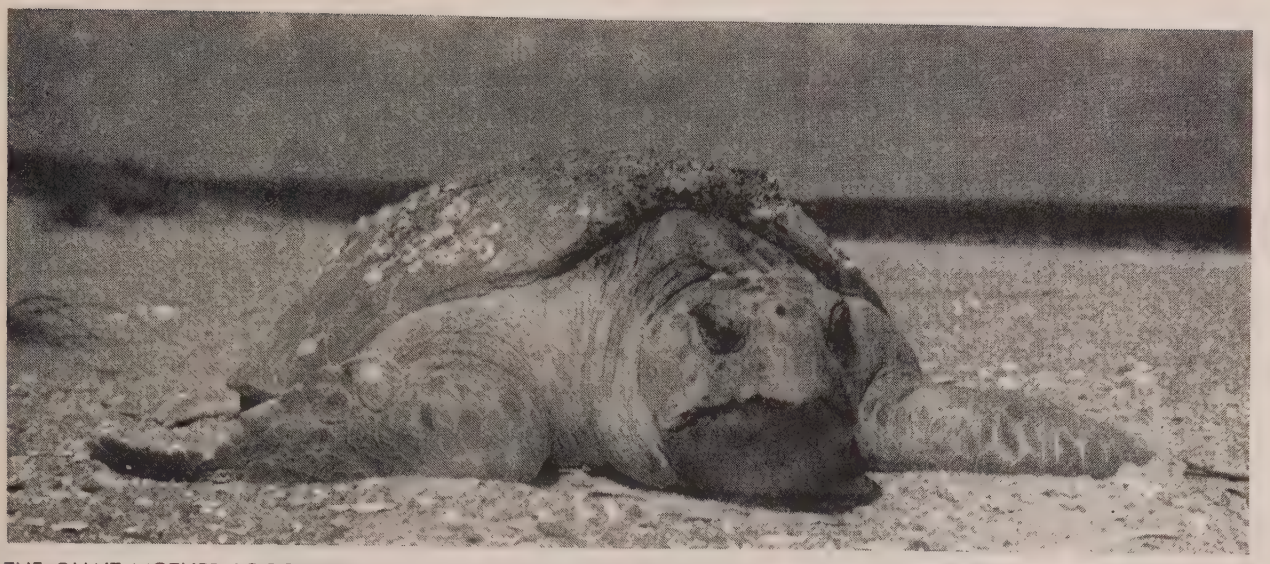
CROCUSES IN THEIR NATURAL HABITAT

A wild garden display in the Swiss Alps, a sign that spring has come to the Wiesener Alps above Davos

Garden Party

By IDA ELAINE JAMES

I muse among my flowers, long grown dear,
Knowing that they are people gathered here.
The rose, in queenly haughtiness, is like
A débutante, imperious to strike
Attention. The forget-me-nots' pale blue
Is babies' disconcerting eyes on you,
In cool sincerity that takes your breath.
White as new snow, untouchable as death
On slender throat, the regal lily stands:
Mutely I give the reverence it demands.
I smile at mischief, challenging and bold
In the red carnation's call, often told
With spicy perfume. Every bit as famed
Is yellow daisy's largess, unashamed
To crown, defiant, shouldering every one,
Exulting in the scorching of the sun.
The stately foxglove towers high, like tall
And rigid dowagers, scornful over all.
Delphiniums will shrug, with mien aloof;
Aristocrats who hedge a guarded roof.
So much, no more, of their due space they take,
Conceding unconcerned when zinnias make
Their strident claims throughout the glaring day.
The lily-of-the-valley hides away,
In shy retreat with downcast head, a nun
Too pure to dare life's searing, draining sun.
The pansy lifts a gay and nectared face
To stare at quaintly patterned duchess lace;
The violet, an abject child in tears,
Soon dried to happiness, as if she hears
A soothing story; while to the day's end,
The moss-rose lifts her loyal eyes, a friend
To every single flowering human gem.
The flower speech is eloquent. Love them
As friends, for all the charms that they display
To make your garden party any day.
The pink of a child's cheek, and her blue eye,
God matched in flowers. Only God would try.



THE GIANT MOTHER LOGGERHEAD HAS PERFORMED HER DUTY TO POSTERITY

Carrying a miniature world of barnacles on her back, she has emerged from the depths to lay her eggs in the warm sands of a Carolina beach and started on her cumbersome way back to the sea

A Monster of the Deep

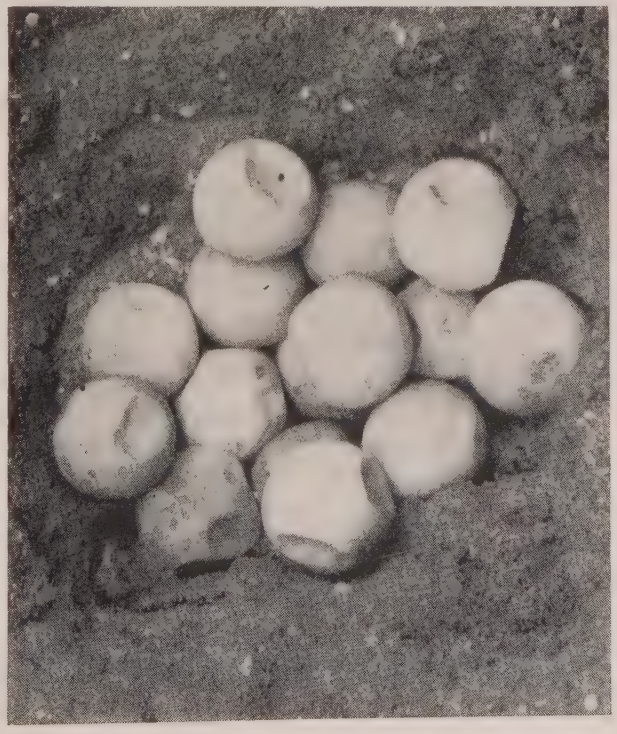
By JOHN M. LOFTON, Jr

Photographs by the Author

UNDER an argent moon of a July night an age-old drama of Nature was unfolding, slowly, flawlessly, as it had countless times before. For untold ages this same scene had been enacted. Although a wild Carolina sea-beach, shimmering before the dusky undulating dunes and the foam-flecked outline of a crashing surf, formed a natural setting for this scene, yet to most people the aged actress taking a solitary part in this affair would have been distinctly an object of curiosity, a creature of mystery, akin to the primeval and the unknown.

Lying prone on a remote key of South Carolina's Cape Romain Refuge, a friend and I watched her approach, feeling elated at being among the few human beings who have seen one of her type intent upon her domestic affairs. For she was a monstrous sea-turtle coming out of the abysmal wilds of the ocean to lay her eggs. Led out of the deep by an infallible instinct, mile by mile, foot by foot, at last she had come to this glimmering strand where she would deposit her white eggs, cover them, pack them down tightly in the genial warmth of the sand, and return to the sea.

With each receding wave breaking over her, and falling in miniature cascades from her outstretched head and dome-like back, she was dragging her way up the foam-swept beach inches at a time. The dancing brilliance of phosphorus and moonlight on the water made a bright background that contrasted with her bulk as she moved forward.



EGGS OF THE LOGGERHEAD TURTLE

They are round and white, with shells like parchment, and can be dented permanently like old rubber balls

As any sounds made by her approach, or by our whisperings, were muffled by the noise of the surf, we lay contented, in immense privacy as it were, gazing with rapt interest as each forward motion of her flippers pulled her farther up the incline of the beach. Now she was clear of the foam, but making for still higher ground. Once she stopped. Slowly, warily she raised her block-like head, turning it slowly from side to side as if sniffing the wind and surveying the desolate strand. Almost holding breath, we waited immobile for her to go on. With the same hobbling movement she headed up

the low grass-topped dunes, stopped once more, and then went decisively toward the spot of her choice. This place was well up in the rolling hills of warm dry sand, sheltered and safe. Here the old mother turned around, felt the ground out a little by throwing up sand, appeared satisfied as to its texture, and began by making a wallow with her body. This accomplished, she prepared the egg-hole by scooping out sand from a small area with her hind flippers. The nimbleness of those seemingly clumsy flippers was remarkable. When the opening was about fifteen inches deep, her egg-laying operation was begun. Placing herself over the hole, she began to lay them in ones and twos. At her nest now, she was as staunch as stone, and was not to be disturbed until she had finished.

A TURTLE TRAIL LIKE THAT OF A TRACTOR
It takes from one to two hours for the mother loggerhead to crawl up the beach, find a place to her liking to deposit her eggs, lay them and return to the sea once more

The time that elapsed between her coming out of the surf and the completion of her vital task was about an hour. Perhaps it was the most important hour of the whole year to her. Long before I was born she must have been performing this same rite, and long after I am gone she probably will be continuing it, I thought. No man can look upon such a scene without realizing how relatively short is human existence, feeling, moreover, that, in a very real sense, whatever creature, from the lowest to the highest, reproduces itself, is laying hold on immortality.

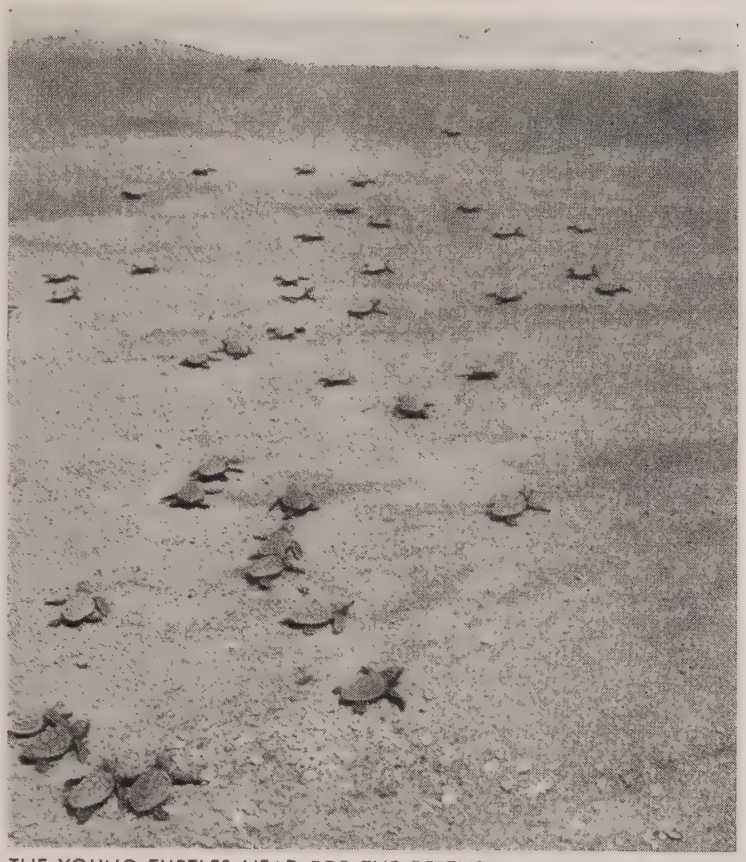
The whole performance of the sea-turtle is executed with extreme thoroughness. On that lone island, by the light of the moon that tinges all things with a soft bloom of wonder, a mighty and compelling law of Nature was being carried out with the exactness and the reverent care of a religious ritual. And, despite the lack of glamour in the appearance of this giant wanderer from the deep, she invested the beach with a strange sense of romance. We felt almost like trespassers behind one of Nature's inviolate veils. We were looking at the heart of things; we were seeing the beginning of a type of life that, in time, would be able to take a masterful place even in the dim and cavernous wilderness of the sea.

Although the loggerhead turtle is a rare visitor to many of our sea-beaches, it is not so with the beaches of the Cape Romain Refuge. It has been estimated that about six hundred nests of these great creatures are made on this area every season. This 110,000 acre tract, situated a few miles northeast of Charleston, extending almost to where the Santee pours its yellow flood into the ocean, is one of the principal wildlife developments of the U. S. Bureau of Biological Survey. Here all forms of wildlife are protected; consequently many species have sought safety in the quiet bays and estuaries and on the tidal flats of this great seaside sanctuary. An effort is being made to discover and to record as much as possible about the life and habits of each wild resident or visitor.

As to the habits of sea-turtles, much remains to be learned. This is because only occasionally is one seen; the ordinary manner of their lives is hidden in the mystery of the sea. As the summer wanes, they leave the coast and retire far out to sea, probably performing a genuine southward migration before November. The beaches of the southeastern United States, it seems, are never visited by a sea-turtle during the late autumn and winter months. But with the spring the turtles return to the bays and inlets, the creeks and the sandy beaches. One is usually first informed of their coming when a bald and benign head is suddenly thrust above the surface of the water. There is a long blowing sigh, an intake of air, and a broad rounded back appearing for a moment before the monster heads downward for the depths.

Mating, as proven by my own observations, and those of other local observers, is accomplished in March, April and May. During the latter half of May, and in June and July, most of the eggs are deposited. Although egg-laying seems to be definitely periodic, no good reason for this has been discovered. Investigation at Cape Romain has shown that an increased number of turtles visit the beach at regularly recurring intervals. At least one individual, however, comes ashore virtually every night during the laying season. So far, the large visitations have not yet been tied up with any specific conditions. It has been suggested that turtles may lay more than once a season, but this has not been proved as yet by any competent observers.

In the hole that she has excavated in the sand, the female deposits from 40 to 300 eggs. They are round and white, with shells like parchment that can be dented permanently like old rubber balls. The number of eggs is probably dependent on the age and reproductive vitality of the turtle. Having carefully covered them and packed them down, she leaves them to the care of the sun and the sand. On repeated examinations I have found that an average temperature of sand about the eggs is 84° F. The heat of the sand at the surface on a day when the thermometer registered 90° was 125°. After a period of about eight weeks the eggs hatch; and the youngsters, a little larger than silver dollars, scramble up through the sand to the surface. Although the ocean may be hidden from them by tall grass, or by the intervening hill of a dune, infallibly as a compass needle points north, they head eventually down toward the surf and the open sea. Young turtles have many enemies, and their mortality is high, but once past the dangers of youth, they may live to a great age. As to this, however, little seems to be known. They may enjoy the longest span of life granted to any child of Nature. A loggerhead turtle may weigh from 175 to 300 pounds or more, and is built on massive lines—a powerful creature. It feeds largely on conchs and other shell-fish, and depends to a certain extent on the strength of its sturdy jaws to crush its food.



THE YOUNG TURTLES HEAD FOR THE DEPTHS
After an incubation period of about two months, the young dig out and make for the ocean, attracted, scientists say, by the area of greater illumination the water affords

Until a few years ago, many beach parties on the Carolina coast used to find entertainment in riding these monsters from the dunes down into the surf. Occasionally they turned one over, and it was quite helpless in this position. There always appeared to me to be an especial indignity in thus rendering destitute of strength and motion one of the most impressive of the dwellers of the deep. Groups of young people, walking the beaches on moonlight nights, used to search for turtle "crawls", and, following them to the nest, used to dig up the eggs, many of which were wantonly destroyed. Some people, however, prize them as food. But hunting for turtle eggs is no longer in vogue in South Carolina. A state law makes it a $100 offense to rob a turtle nest for commercial purposes. Thus the state is cooperating with the Federal Government in making this great reptile a member of the protected group of wild things that are endangered.

In other sections, however, reports of nest robbing continue to come up. Some time, perhaps within the next fifty years, human beings may see the last survivor of this great reptile species come blowing to the surface.

When the old submarine mother we were watching had laid her last egg, she began methodically to cover them by kicking sand over them. Then she gave the sand some firm final pats, and started ahead, kicking sand back over the nest as she moved for two or three feet. Now satisfied with her work, she turned and lumbered slowly down toward the surf again. Her cumbrous complacence led me to believe that her thought might be, "Well, I've done my part." Each rolling moonlit breaker buried her deeper until finally she was swallowed up in a sheet of sweeping white foam. Save the irregular track that her coming and going had made in the sands, there was nothing to indicate that one of the world's least-known and rarely-seen monsters had emerged from her native element, performed a vital duty, and returned in silence to the mysterious deep.

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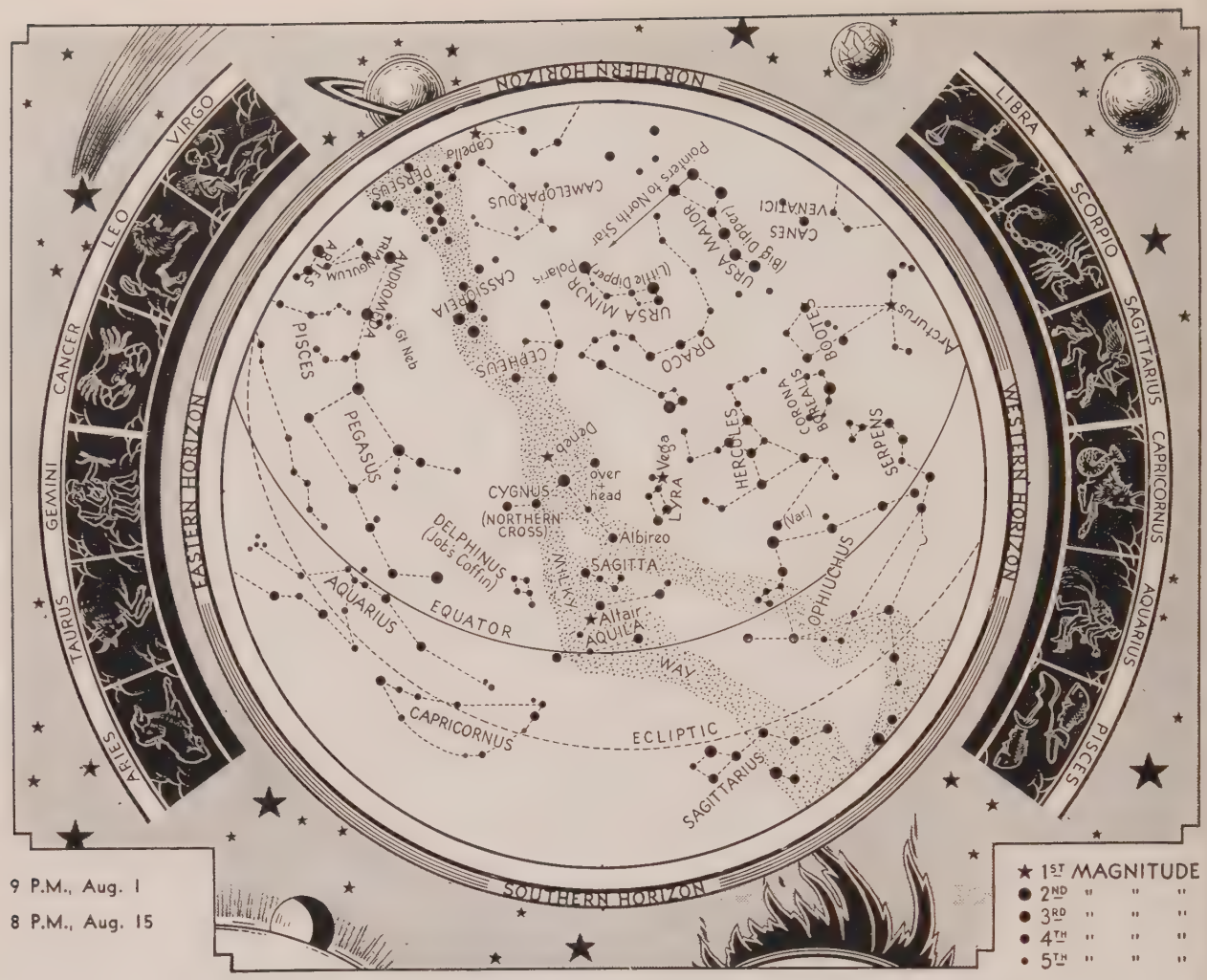
DIVIDENDS

By OSCAR OSTLUND

No music comes with fuel you buy,
But he who chops it in the brush
Will hear, close to the earth and high,
The halcyon airs of wren and thrush.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

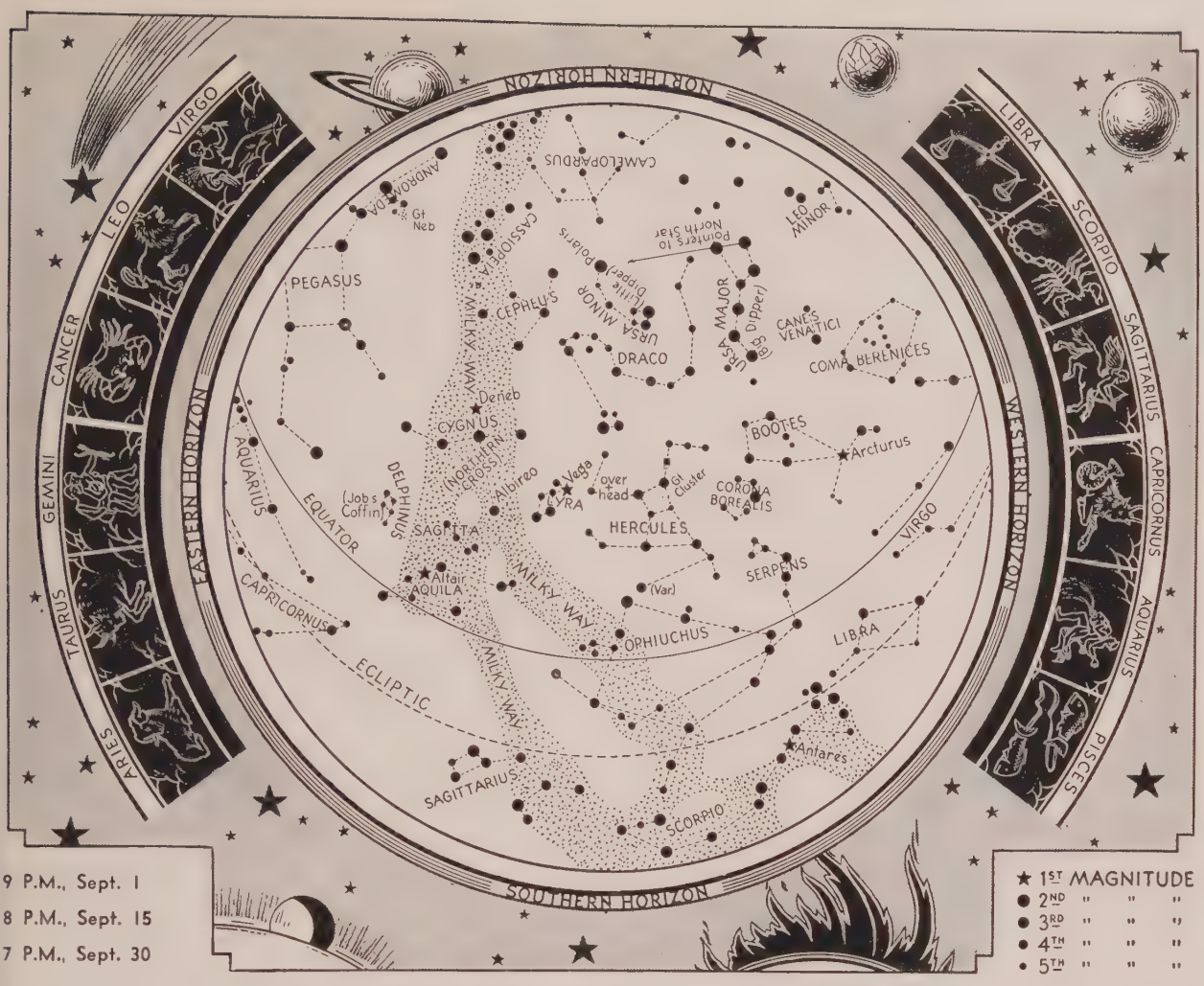
Facts and Fancies About the Moon

By ISABEL M. LEWIS

No member of the family of planets, and their satellites, that revolve around the sun is more troublesome to the astronomer than our own satellite, the moon. Unfortunately it will not keep strictly to the path through the heavens that has been laid down for it, and to predict correctly its position from day to day and year to year proves to be one of the most difficult problems of celestial mechanics. Some of the greatest mathematicians and astronomers of all time have spent years of their lives in a study of the motion of the moon. Yet it cannot be said that even now the causes of all its irregularities of motion are completely understood, although its position can now be predicted with a high degree of accuracy.

In more than one way the moon adds to the burdens of the astronomer. There are, for one thing, the eclipses of the sun and moon, in which the moon is one of the chief actors. Much time is spent in the prediction of these phenomena; more in organizing expeditions to many different corners of the world to observe them, and still more in reducing and interpreting the results of the observations. Then there are the occultations of stars by the moon, hundreds of which are predicted and observed every year. More time is spent in the reduction and discussion of the results that lead to better determinations of the position of the moon in its orbit. Then there are the irregularities of its limb which may affect the determinations of its position. These are due to the mountains and valleys of the moon seen in profile along the edge. They give that saw-tooth outline of the limb that upsets the astronomers' calculations, and they also produce the phenomenon known as Baily's Beads, which are seen at the beginning and ending of a total eclipse of the sun. These are brilliant beads of light due to sunlight shining through the valleys of the moon. They represent the last light from the solar surface that is visible before the moon completely conceals it.

In addition to the problems associated with the theory



of the motion of the moon in its orbit, and the irregularities of its profile, there are others that have to do with the nature of its surface features. Why should its face be so pock-marked? What is the origin of all those pits and craters varying in size from mere pricks in the surface a few hundred feet in diameter to great walled plains and terraced craters, often with central mountain peaks, that may be sixty miles or more in diameter? Are they associated with, or a product of, great volcanic activity in the dim past, or are they a result of intense bombardment of the surface by meteoric masses of a size and frequency that can scarcely be imagined today when our solar system is practically cleared of meteors of such size? The origin of these formations peculiar to the lunar surface has long been a subject of discussion, although the majority now seem to favor the theory of volcanic origin. Then there are the strange streaks and rays that radiate from some of the more conspicuous craters, in particular Tycho and Copernicus. From the first named crater they radiate like spokes of a wheel extending for hundreds of miles. Do they represent the splashings from the impact with the surface of some great meteoric mass, or a welling to the surface through fissures of some volcanic substance? They have no elevation above the surface and cast no shadow. Copernicus has a feathery ray system of some similar, light-colored substance in place of the long, meridian-like rays emanating from Tycho. Both of these ray-systems may be seen even with the unaided eye at the time of full moon, and there are many others, surrounding less conspicuous craters.

The roughest portions of the lunar surface, in the southern part and surrounding the circumference of the disk, are also the brightest. They have a much higher reflecting power than the comparatively smooth, low-lying areas, called maria, that are confined chiefly to the northern hemisphere of the moon. These great expanses, grayish in color for the most part, were believed at one time to be actually seas, although we know now that on the moon there is neither water nor air and that life therefore must be non-existent. It is a harsh-featured world of sharply outlined mountain peaks, of lofty mountain chains, deep ravines and crevices, of countless terraced craters with central peaks, ringed plains and walled plains, largely a porous, pumice-like surface with its deposits of sulphur and congealed lava flows. The moon is a world of great extremes of temperature, where the burning heat of a pitiless sun, whose rays are unmitigated by atmosphere or cloud, alternates with the frigid cold of a lunar night of two weeks' duration, for lunar day and night each last for one half of the period of the moon's revolution around the earth. Shadows are harsh and black. There are no signs of life. Without an atmosphere no sounds are heard.

So the astronomer pictures the moon; but the fancy of

man has pictured the moon differently. Through the ages he has grouped its mottled markings of light and shade into strange forms. At full moon we see the beaming, rotund face of the Man in the Moon. Many trace the features of the Lady in the Moon, or the Crab, or the Donkey. The moon was suspected of having an effect upon the sanity of those who were too long exposed to its rays, hence the word lunatic. Although there is no scientific basis whatever for it, many farmers believe that certain crops should be planted in certain phases of the moon. One sign there is, however, which may be taken seriously. A ring around the moon does presage an approaching storm for it cannot be formed without the presence of considerable moisture in the air, approaching the saturation point, and it is rare that rain does not follow within a day or so of the appearance of a ring, or halo, around the moon.

During the months of August and September we will find no planets visible in the evening sky until the latter part of September, when Jupiter and Saturn will appear in the eastern sky in Aries. These two planets will be close together throughout these two months, and will be striking in appearance; Jupiter a deep golden yellow, and, next to Venus, the brightest planet in the sky, and Saturn pale yellow and about equal to Vega or Arcturus in brilliance. On August 6 both planets will come into quadrature with the sun within an hour of each other, and will be visible the second half of the night. They will also be in conjunction on August 15.

Mercury will be in the morning sky in August and will reach greatest elongation west on August 10, but will be only a few degrees above the horizon at sunrise and poorly placed for observation. It will be too close to the sun to be seen during September. Mars is in conjunction with the sun on August 30, when it passes from the evening to the morning sky. It will be too close to the sun to be seen during these two months.

Venus will be a magnificent morning star in August and September. On August 2 it will have its greatest brilliancy and may be seen easily even after the sun has risen. On September 5 it will reach its greatest western elongation, when it will rise four hours before the sun. One can never mistake it for any other object as it far outshines all other planets.

Autumn will begin on September 22 at 11:46 P. M., E. S. T. when the sun will cross the equator going south.

"Angels of the Swamps"

By EDITH M. LAING

EGRETS—a specially attractive name for white herons—are pictured on the stamps of Borneo and Liberia. Ivan Sanderson in his thrilling book, *Animal Treasure,* tells of fearless egrets that stalk about the native villages of the Cameroons. Around the expedition's camps they became a nuisance, poking about the skinning tables. But they also afforded many a good laugh. The scientists always hung the cleaned skulls of specimens in muslin bags on a drying line outdoors. Naturally the flies knew a good place to lay their eggs. Then came the egrets, struggling to keep a toe-hold on the shaky line while reaching down to get at the grubs on the swaying bags below, and often toppling ignominiously to earth amid a swarm of buzzing flies gathered near the place.

Dr. Fairchild says that white egrets in the meadows and olive groves of Morocco are strictly protected by Mohammedan law. In a recent popular story of the South Seas, the heroine was always accompanied by her pet white heron. So we see that no one country enjoys a monopoly on these beautiful birds.

Two species are found in the United States, the American egret, *Ardea egretta,* and its smaller, rarer cousin the snowy egret, *Ardea candidissima.* The beauty of these "angels of the swamps" almost caused their extermination, for as the nuptial plumes coveted by the millinery trade are worn only at the mating and nesting season, the taking of them meant death to both adult and nestlings. Fortunately the Audubon Societies came to the rescue, and Federal laws now protect the birds and prohibit the importation of plumes. After all, such laws are but a restatement of the law of Moses, which provided for the protection of birds with young.

The array of bridal plumage is surely among the Creator's most exquisite expressions of beauty. In the American egret the slender fairy sprays overspread the wings, and extend back to the tail tip. The yellow bill has a greenish patch near the eyes, and legs and feet are black. The aigrettes of the snowy egret sweep back and curve at the tips. For further adornment this egret wears a special head crest. The bill is black with yellow base, matching the black legs with yellow feet and black claws, and setting off the white. The birds are usually seen feeding in areas of swamp or lagoon. Towards evening they make for a common roosting place. However, the writer knows a bird that one winter customarily spent the night in solitary splendor in a giant eucalyptus beside the village post office.

In coastal sloughs about San Diego, California, both species are becoming more numerous each year. The elegant snowy birds silhouetted against a background of green and russet reeds, or perhaps agleam in the mysterious rose and lavender waters of sunset, lend a highly decorative note to the landscape greatly admired by thousands of travellers along the highways and transportation lines that run past their haunts. But no matter what whizzes by, or how many planes zoom overhead, the birds preserve their dignified calm and continue serenely feeding or meditating, confident in their protected asylum.

New Park Director

Newton B. Drury of California has been appointed Director of the National Park Service to succeed Arno B. Cammerer, whose resignation was tendered because of ill health. The retiring director will remain with the Service as director of Region I. Mr. Drury comes to his new responsibility after more than twenty years of activity in the field of conservation with which the National Park Service is concerned. As the driving force in the Save the Redwoods League, he was successful in accomplishing the preservation of important tracts in the coast redwood region of northern California. At the same time he has taken a leading part in the movement for building up the state park system of California.

Poetry Contest

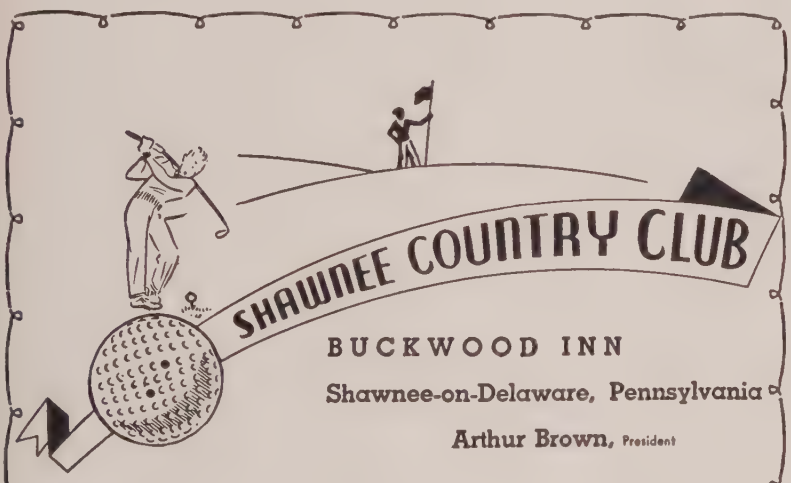
For two successive years now NATURE MAGAZINE has published the winning poems in the Elberta Clark Walker Poem Contest conducted by the Chattanooga Writers' Club of Chattanooga, Tennessee. We hope to do so again, space permitting. We have just received announcement of the 1940 contest, which closes November 1, 1940. Space does not allow publishing all the rules, but a stamped, self-addressed envelope sent to Mrs. Walter C. Johnson, 909 Oak Street, Chattanooga, Tennessee, will bring all the details.

Shade Tree Conference

Subjects of interest to those who care for our shade trees, and to individuals concerned with tree care, will be extensively discussed at the Sixteenth National Shade Tree Conference in Detroit, Michigan, from August 27 to 30. Among the subjects scheduled for presentation and discussion are: Raising the Standards of Tree Experts; Nature and Control of Shade Tree Chlorosis; Wound Dressings; Some Troublesome Pests of Conifers; Diseases of Shrubby Plants; Photography for Arborists. A plant clinic will be held.

Birds and People

People are pretty dull creatures in the estimation of the school children of Missouri. Preparatory to working up an outline of study in wildlife conservation, the Missouri Conservation Commission conducted a survey of Nature interests. School children were asked to check lists indicating the subjects in which they were most interested. Eighty-one per cent placed birds at the top of the list. Other interests were rated in the following order: game animals, flowers, trees, fish, fur bearers, soil, people and water.



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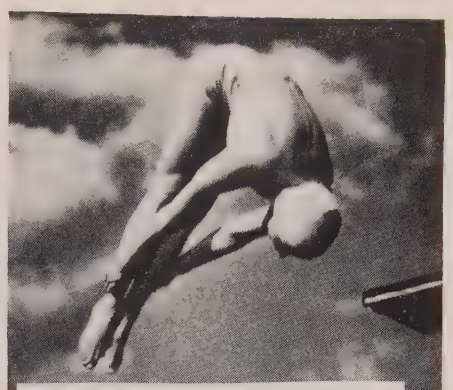

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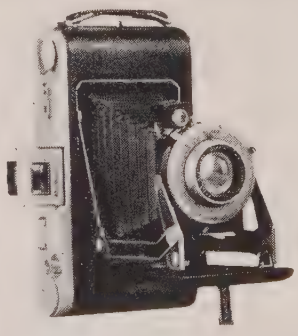

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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Where Angels Fear to Tread

A doctor friend recently told me of one of his patients whose mother had been asked if the child got plenty of vegetables. To the question she replied, "Wegables? Sure she get plenty of wegables. She get chicken soup, oatmeal, Cream of Wheat. Gosh!" We cannot question the spirit of cooperation of this fond parent, but certainly she was limited in her knowledge of what is meant by vegetable.

Our chief reaction is naturally one of regret that the mother mistook chicken soup for a vegetable, and that by so doing she interfered with the recovery of the child, whose interest she held above all else. We can readily forgive her, particularly because of her willingness to correct the situation when it was pointed out to her.

But as school opens this fall there will be many similar situations. Somehow we cannot overlook these so readily. A girl from the southwest writes me that next year she is to begin teaching science. She says that she is taking a course in it at her teachers' college, but has only a vague idea of what it is all about. She has a job teaching science and wants to know if I will write and tell her—in a letter—what she should do. Another writes that she has a job as Nature counselor in one of the major summer camps. She says that she has never been in a camp, that she has not taught science and that the only course she ever took in it was in summer school some years ago. She wants me to write her in a letter and tell her how to lead a crowd of inquiring minds through a bit of terrain that neither she nor I have ever seen. Such a letter is obviously impossible. As a professor of education, I might suggest a lot of aims and objectives to her, but what good would that do?

We can hardly blame these prospective teachers for accepting a chance at any position in these days when work is not easy to find. We can, with justice, criticize the system that attempts to fit these square pegs into round holes when there are so many splendid round pegs just waiting for a chance to make themselves useful.

As the universities and other training centers open their doors this fall there will be hosts of young people seeking to prepare themselves for a chance to make a living, and to contribute to our national happiness. With wise guidance, they should be able to render a distinct service. There are jobs and there are people who, with adequate training, should be able to fill them well. How can we bring the two together? How can we prevent circumstances from forcing students to do something for which they are not prepared?

I do not pretend to be able to speak for all situations, but, as I write, I happen to know of at least a half-dozen good jobs for which I can make no satisfactory recommendation. One is in a private boys' school; one in a teachers' college. Another is in a junior college; others are in high schools. One is for the head of a science department, and another includes in its requirements that the applicant have had at least five years of practical experience in running a greenhouse.

The unfortunate thing is that while I happen to know of these and of other positions, I do not happen to know of people who can be recommended to fill them. Yet I do know of plenty of splendid young people who do not have jobs and who need them badly.

If my experience in this field is significant, I would say that there is every probability that a splendid job should be awaiting any intelligent young man who has had a year or so of successful teaching experience in the elementary and secondary schools, who is willing to prepare himself along *broad* lines in science, and who is willing to keep himself reasonably informed in the field of professional education while working towards an advanced degree. The chances for women do not seem, just at present, to be as good. This may and should improve.

I know of any number of superior young men, trained as specialists, for whom we can get no jobs. Most of them have gone haywire, either in professional education or in some limited field of science. Few of those in science have even an elementary acquaintance in all of such major fields as botany, zoology, earth science, physics and chemistry. Many may have an abundance of training in one of these fields, but no training in all or in some of the others. I happen to know of two new Ph.D.s in biology who have never had a course in physics in their lives. Because of this, in part, at least, they cannot get positions of which I know. How one can be a good science teacher in the upper academic fields without fundamental knowledge in all of the major branches is difficult to understand.

I would be the last to imply that all one needs to be a successful teacher is training in professional education. I know of too many such people in responsible positions in science education to defend the idea, but somehow we must work out a program where the good of academic science and the good of professional education may be brought together harmoniously for the betterment of Nature and Science education. We cannot get what we want by producing people who do not know where Greenland is but who do know six ways to teach about it. Somehow we must restrain the educators who assume that they are qualified to teach or supervise anything and everything at any level, and we must show the professional scientists that the possession of the methods and teachings of science by a person does not guarantee that he can become a successful teacher of science.

One high-ranking professional educator writes that scientific background is a "luxury easily acquired;" that about all one needs to do to become a successful science teacher is to read Jeans, Shapley, Huxley, Jaffe, Mather, DeKruif and others some evening. One can assume safely from the writings of this educator that this is about the technique which she must have followed in her own preparation. The ease with which she and her associates assume responsibilities they cannot appreciate reminds me of the mother mentioned at the beginning of this article. None of them lacks confidence in his own authority. This writer goes on to say that, while scientific background is a "luxury," the teacher *must* be an expert in the knowledge and understanding of boys and girls. How a successful teacher of field natural history can be produced by this method I fail to see, although it may be done. Not all of the successful people in science or in education have come through the disciplines of the schools. Some might not have survived these disciplines, but few would consider adequate scientific background, a "luxury easily acquired."

There is every probability that eventually we will be faced in this country with some program that will require universal training of our youth in the wise use of our resources for the national good. That time may come sooner than some expect, and when it does come there will be a mad scramble of most people to find their place in the general scheme of things. Conservation education must, of necessity, play an important part in this picture. The American Nature Association has for years sponsored a careful and thorough study of the content and methods of educational practices in this field. For years NATURE MAGAZINE has been showing its readers the essential values of the natural environment in which we live. The same use of this natural environment by the present and succeeding generations is definitely a part of a national defense program. One cannot fully appreciate this situation by sitting down some evening and reading a book that will supply the necessary "luxury" of a scientific background. This sort of thing must grow on us. We must keep everlastingly at it. We must abandon the techniques of the politician in education and in science, and find our leadership among those who have been and are willing to devote time and effort in this field. We must marshal the best that all fields of human endeavor have to give to the end that this part of the earth, at least, may continue to be ours; that we may decide what use will be made of the power in our streams, the wildlife in our fields and woods, and the companionship in our fellow Nature lovers.

We have plenty of schools able to train young people to meet the situation satisfactorily. We will have plenty of opportunity for those who are trained to find fields for distinguished service. We have plenty of people who really want to do the right thing for everybody, but somehow we have not as yet been able to integrate all these forms of wealth. We find too few leaders willing to take criticism, and too many ready to offer advice that they are not qualified to give. We are like the fond mama who was advised to give her child vegetables. Everyone is sure he can solve the problem—that he knows the answer. Surely we give assistance gladly to those who need our help. We have lots of "wegables." We give them "chicken soup, oatmeal, Cream of Wheat. Gosh!"

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NATURE IN PRINT

(Continued from page 383)

yet to come to write of the outdoors in such a way as at the same time to entertain, inform, and counsel.

Down to Earth is illustrated and decorated with some forty-two drawings by Gertrude M. Bradley and D. F. Levett Bradley.

The withdrawal of another writer from the frequented places of modern civilization has been of similar advantage to readers who have had available F. Fraser Darling's *A Naturalist on Rona: Essays of a Biologist in Isolation* (University of Oxford Press, $2.50). Dr. Darling is an English naturalist whose recent work on *A Herd of Red Deer: A Study in Animal Behaviour* was recommended for "required reading in our wildlife management curricula" by W. L. McAtee in the United States Biological Survey's *Wildlife Review*. Mr. McAtee pointed out that Dr. Darling's research in the field had "yielded the writer not only factual rewards but also the ultimate satisfaction all naturalists crave but few realize—of living in and as a part of nature." On the far northern island of Rona in the Outer Hebrides Dr. Darling enjoyed the same advantages for some months in 1938—interrupted only by a ship bringing a forced departure during the September international crisis of that year. The resulting collection of essays provides engaging and picturesque reading and has various values.

Dr. Darling's concern was with his own scheme of living as well as with that of wilder creatures. "Three months on Rona so far," he writes at one point, "and twenty-one months of the past two and a half years spent on small uninhabited islands; not as research workers pure and simple, but as a family trying to live a family life. We had almost evolved a culture; certainly we had acquired a technique for living our isolated lives and the environmental complex of the islands had entered deep into us." Like R. M. Locksley in his *I Know an Island*, recently discussed on this page, Dr. Darling gathers together local lore and history and comes close to telling an idyllic tale in a well-sketched island setting, illustrated with a series of remarkably clear and expressive photographs taken by himself.

Dr. Darling believes that "the aim of science should certainly be to remove the mystery from natural phenomena, but not to take away wonder or that quality of nature which allows for the development and play of aesthetic appreciation." With such an aim himself, he says that what he is trying to do is "to find out what animals do and what are the factors influencing them." Success, he realizes, would be of great significance in human affairs, and he points out with alarm that "these are days of conceit in conquest of nature instead of feeling we are working in concert with her." He declares that "until we are prepared to go to the animals and find out their relations with each other our biology must be moribund and deny its very name."

Outstanding in *A Naturalist on Rona* for information value are Dr. Darling's discussions of the grey seals, whose lives he shared intimately and described in detail with a delicate sense of appreciation. A secret of the voice that brought the seals to him he says is his alone "and will remain so, lest it should ever come to be misused." The other

(Continued on page 429)

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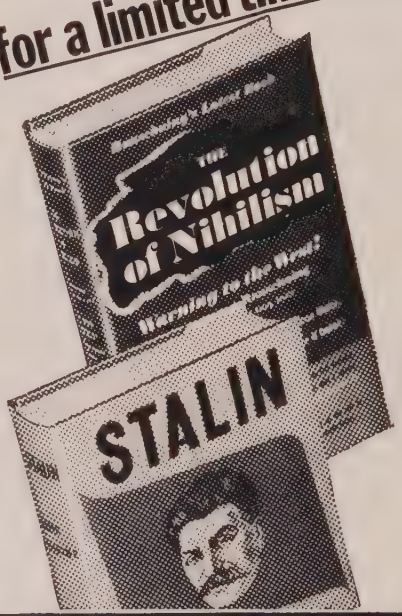

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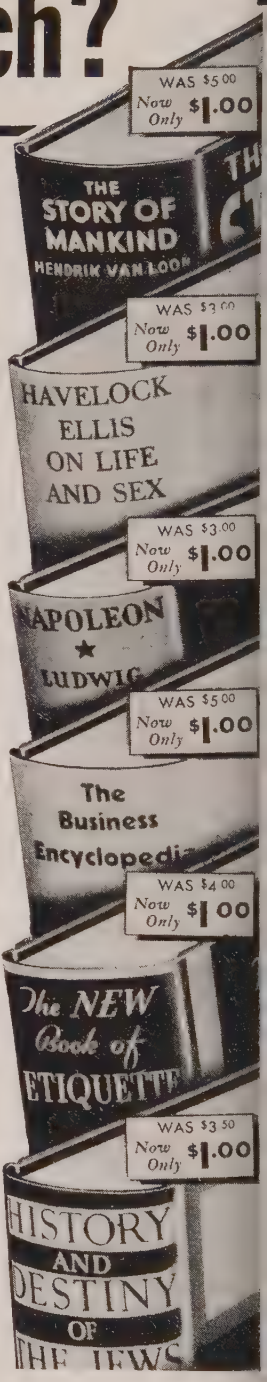
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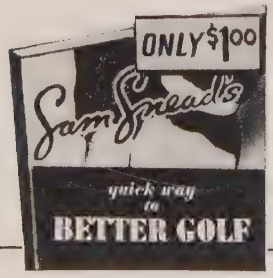

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NATURE IN PRINT

(Continued from page 427)

wildlife of the island is also described, and the essay collection includes discussions of "The Display of Birds", "The Social Life of Animals", "The Mystery of Antlers", and "Sanctuaries for Wildlife."

Throughout all this writing Dr. Darling shows a deep respect for life, and in his essay on sanctuaries he discusses this explicitly. "Respect for life," he says, "is not squeamishness. It is the regard which says in effect that here is an individual born into the world, moving with a quality called life which once taken cannot be replaced. If I kill knowingly and cut short this individuality, what lasting good can I expect from the act?" His entire discussion is similarly stimulating and thought provoking.

A Naturalist on Rona with its profound comprehensions, and *Down to Earth* with its fine perceptions, make interesting reading together, exemplifying the varying benefits of two kinds of isolation and the common persuasion of two "isolationists" who are social creatures in the best sense.

Kingdom of the Trees

This is the excellent title that Erle Kauffman has given to a book on trees for young people that lives up to the fine choice of name. Here is a book that will be as valuable as it is fascinating for children of upper elementary and junior high school age. Mr. Kauffman has chosen the device of telling his story through Uncle John, Ben and Betty. Uncle John is a forester and initiated into all the secrets of the trees, and, with Mr. Kauffman's able assistance, he lets the youngsters in on these secrets. This is our idea of an enjoyable textbook, although one would not, perhaps, think of this book as such. Attractively printed, it contains sixty-seven black and white drawings by Calvin Fader that admirably supplement the text. The book is published by Reilly and Lee, Chicago, at two dollars.

Wings

Great Wings and Small is the title that Frances E. Clarke has given to her latest collection of outstanding Nature stories and articles. This brings this group of books to five, the other four having been collections of cat, dog, horse and animal stories. This quintet of volumes makes a Nature library of distinction, one that may be read and reread since most of the stories Miss Clarke has chosen for inclusion will live. This most recent book is, as the title suggests, a collection of bird stories. Among the authors represented in this avian anthology are Jacob Bates Abbott, Thomas Bailey Aldrich, William Beebe, John Burroughs, Alan Devoe, Walter Prichard Eaton, Hal G. Evarts, W. H. Hudson, Cherry Kearton, Olive Thorne Miller, Jack Miner, John Muir, Arthur Newton Pack, T. Gilbert Pearson, Gene Stratton Porter, Edward A. Preble, Archibald Rutledge, Herbert Ravenel Sass, Ernest Thompson Seton and Mark Twain. The selection has been as wise as in the earlier volumes. As with all of these books, the publisher is the Macmillan Company and the price is $2.50.

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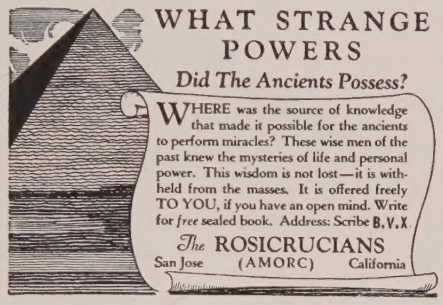

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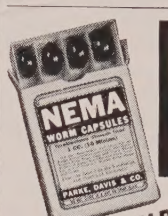

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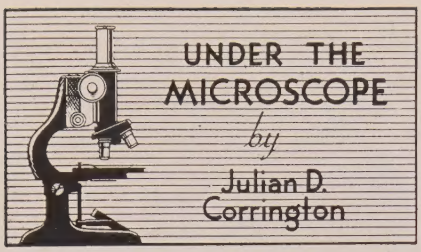


A Leaf Skeleton Mount

There are all kinds of skeletons in this world, from the bony framework of man and other vertebrates pored over by students of biology and medicine, to that metaphorical occupant ensconced in the family closet. Although commonly restricted to the internal organs of support of vertebrates, the term can be properly applied to all sorts of corresponding structures whose functions are support, protection or the attachment of muscles. Thus the limy or glassy spicules of sponges, the connective tissues of the earthworm, or the shells of clams and oysters, are all skeletons. By extension, the word has been applied to the system of fibro-vascular bundles that ramify throughout root, stem and leaf of higher plants, combining as they do the rôles of support and circulation.

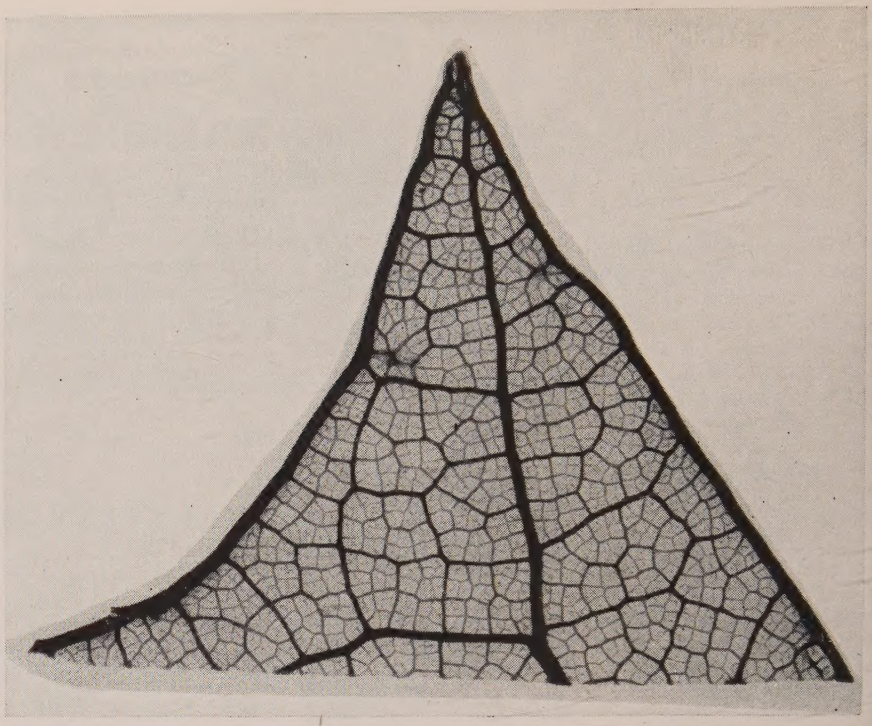
From a fancied similarity to blood vessels, branching tubes in the wing of the butterfly and in plant leaves have long been known as veins. In the butterfly they are actually air tubes or tracheids that were used as the wing grew to pipe oxygen to developing tissues, but dried up and remained as lifeless supports for expanded and mature wings. In leaves, each vein is a fibro-vascular bundle, containing ascending carriers of water termed xylem vessels and descending channels for food, manufactured in the leaf, known as the phloem, and made up of sieve cells. The xylem includes woody fibers, which contribute the support necessary to maintain the leaf blade in expanded condition.

These veins branch repeatedly and the method of branching is a character used in classification. Monocotyledonous plants, such as grasses, corn, iris and Solomon's seal, have parallel veins, while dicotyledons, such as buttercup, maple, violet or oak, have netted veins. One may readily inspect the larger veins in the living leaf, but in addition a microscope slide preparation of a small portion of the leaf, macerated so as to get rid of other tissues, will disclose the finer branches and make a handsome and instructive slide.

To prepare such slides, clip portions from various leaf blades with scissors into half-inch squares and boil for an hour in a macerating fluid. Experience has shown that fully mature leaves collected during dry weather in midsummer make the best mounts.

There are many formulas for macerating fluids. Here is one recommended by the General Biological Supply House, Inc., Chicago: sodium carbonate, 2 parts; calcium hydroxide, 1 part; water, 8 parts. Boil these together for 15 minutes, cool, then filter.

After boiling the leaf pieces for an hour in this mixture, remove one with a forceps and place it in a flat-bottomed glass dish, such as a Syracuse watch glass, or Petri dish, with a small amount of water. Rub the leaf carefully with the finger, or a soft brush, as a camel's hair. If all the soft tissues come away readily and leave only the veins, all the remaining pieces may be so prepared; if not, boil them for a while longer and try again.



MOUNT OF A LEAF SKELETON

Bleach finished pieces in chloride of lime, one teaspoonful to a quart of water, for a few minutes, until white. Then rinse well in several changes of water.

Run one piece up through the alcohols, clear in xylene and mount in balsam. Stain a second piece with eosin, and a third with fast green; generally it is best to employ these stains as 1% solutions in 95% alcohol and use them at the time when the leaf reaches 95% alcohol while dehydrating, then rinsing with fresh 95% alcohol before proceeding. Try a double stain on one piece, using safranin—1% aqueous, applied after the water rinse, for 24 hours—and counterstaining with light green in 95% alcohol. A well-stained slide is a beautiful preparation, excellent for projection or photographing.

The Microscope Makers

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Up in High Barnet, Hertfordshire, to the north of London, they are probably not making many microscopes at the Works these days. We haven't heard lately from our friend and ASAM member, W. E. Watson Baker, but doubtless he is directing all of the energies of the celebrated firm of Watson to the making of prism binoculars, periscopes, sighting telescopes for guns, and many special kinds of photographic and other lenses—just as was done in 1914—all of which is a sad commentary on what happens when the useful arts of peace must be diverted to the manufacture of destructive agencies for war.

Few microscopists in this country have seen any of the very numerous products of W. Watson & Sons, Ltd., whose business offices are at 313 High Holborn, London W. C. 1, England, owing to domestic competition and high import duties—but their microscopes, prepared microscope slides, telescopes, cameras, binoculars, spectacles and hundreds of other items are famous the world over and are to be found, like the British flag, wherever the sun is shining. Readers of *Under the Microscope* have noted our offer on several occasions to distribute copies of Watson's *Microscope Record,* and have eagerly snapped up the available supply within a few days.

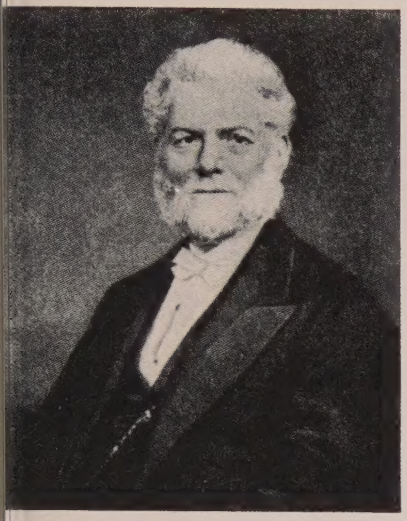
Owing to a fire, several moves, and a lack of records, not much is known of the early beginnings of Watsons, who have recently celebrated their Centennial. William Watson, the founder, specialized in optical instruments, thus forming the basis from which the later business developed. His portrait shows a man of the highest type of intellect and character, and we are prepared in advance for statements that he was a warden of his church and a trustee of many charities. In those days High Holborn was a residential as well as commercial section and Watson was a well known and popular member of the community.

William Watson was born in 1815 and established his business under the name of W. Watson in 1837, at 313 High Holborn, where he died in 1881 at the age of 66. When built, 313 was one of the tallest houses in the district, dwarfing the next-door tailor's shop. In some respects the neighborhood has not changed, many old landmarks remaining, but Furnivals Inn with its ancient posting facilities and flower boxes and the famous Inns of Court Hotel, for long the rendezvous of London visitors having business at the Law Courts, have disappeared before modern progress as represented by the Prudential buildings, and Fulwood's Rents, which were lodging houses, are now office sites.

In those early days working hours were from 8 a.m. to 7:30 p.m., and microscopes were made by hand, the product of a single craftsman who was sufficiently proud of his optical offspring to place his name on the stand. High Holborn was paved with cobbles and men came to work on a knife board omnibus, with straw scattered on the floor in wet weather. The factory was lit by gas and heated from a central coke stove, so inefficient that the rooms remained cold until, by excluding all ventilation, a passable warmth was at last attained. Boys fetched cans of beer suspended

their handles from a long horizontal stick, d for outside refreshment there were only bakers and coffee houses.

The sons of William joined the business in ccession; William (eldest son), 1865-69; omas Parsons, 1873-97; George, 1876-83; d Charles Henry, 1883 to the present. F. W. atson Baker, grandson of the founder, was o admitted in 1883; W. E. Watson Baker, rat-grandson, in 1908. The son Charles, the ndson, the great-grandson, and C. D. Rey-



WILLIAM WATSON
1815–1881

oach make up the present Board of Direc-. Three generations of the one family on same Board is certainly an unusual record. Of these various members of the family, one responsible for making microscopes cameras, the two leading Watson pro-itions, was T. P., a man full to the brim nergy, vision and constructive genius. He a most attractive personality, so that mem- of the British Royal Family and nobility e frequent visitors to the plant, and also anner that encouraged his highly-skilled kmen to still further efforts. His early th, at 42, left a big gap at the establish-t as well as in the hearts of a host of nds. During his management, microscopes e made at 313 High Holborn; later this of the business was transferred to Ful-'s Rents, and in 1906 to new works ted at High Barnet. This factory was d by fire in 1910, rebuilt that same year, notable additions have been made in the years, 1914-1918, and also in 1919 and 5-36.

The earliest catalogs extant are dated 1875 include one microscope; two years later e models are listed, and each subsequent ion shows a constantly expanding busi-, the most recent catalog, the 36th edi-, being published in seven parts and total-nearly 500 pages.

The Bullock and Wales models were the ones made, and then in 1889 appeared r well-known Edinburgh Students series microscopes, laying the foundation for ntity production as public demand in-sed. In 1891 Watsons produced the Van rck microscope and, since the first World r, the Service model, their latest and finest eral instrument. In addition they manu-ure a full line of special microscopes for ous professions, such as metallurgical, ographic and binocular stands.

Watsons give a great deal of credit to the teur for bringing about efficiency in mi-croscope construction and they have always worked closely with and considered the requirements of this important class of customer. Their WandS microscope, semi-miniature and inexpensive, is a fine instrument indeed, and the only one we have seen in this class with a revolving nosepiece and a condenser.

Among Watsons' claims to superiority are a one-piece body construction on their finer models, eliminating separable parts as used by others, and a built-in method of making minor adjustments to compensate for wear of the working parts. Association with Professor A. E. Conrady, leading practical and theoretical optician, assured notable progress to Watsons in the optical end of manufacturing.

This firm is justly proud of their trained staff of faithful artisans and craftsmen, listing 26 persons who have been with the company 20 years or more, of which number 15 have been employed for 30 years or more, 9 for 40 or more and 5 for 50 or more. Watson's *Microscope Record* has reached issue number 47 and is widely known for its excellent feature articles and short items; it represents the highest type of house organ, restricting advertising matter to a minimum scarcely ever seen in America. The company has 18 agencies in the Empire and 5 in foreign countries.

Unlike John J. Bausch, whose history we have previously retailed, the founder of W. Watson & Sons, Ltd., unfortunately never lived to see the final flowering of the great firm that bears his name.

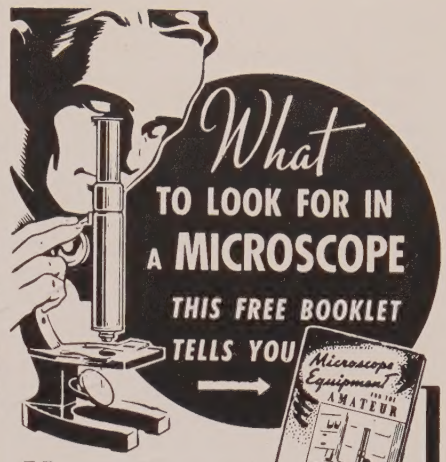
Beginner's Primer

For the benefit of new readers we may state that under this heading we have been surveying the chief orders of insects and the types of slide preparations that can be made from their representatives. This month brings us to the Order Neuroptera, placed relatively low in the scheme of insect classification in spite of the fact that the metamorphosis is complete. The mouthparts are formed for chewing and there are four wings that are membraneous and net-veined (neuro, nervepteron, wing, alluding to the great number of "nerves" in the wings; nerve and vein being both common and equally incorrect terms for the tracheids supporting the insect wing).

This is a small order, and few of the species are familiar to the average person, but these few are worthy of mention and provide us with some interesting material.

If you like to go bass fishing, then you are probably on speaking terms with the dobson or hellgrammite, larva of a huge fly whose wing expanse runs from four to five and one-half inches, and whose scientific name is *Corydalus cornutus*. The second word, meaning horned, refers to the extremely long mandibles of the male adult. Chief attention, however, is claimed by the larva, three inches or more in length, and one of the favored forms for dissection under a lens for study of the details of insect internal anatomy. The heart, tracheae and central nervous system are especially well shown and comparatively easy to expose and display, from whence they may be removed to slides for processing as whole mounts. Search for these larvae on the bottoms of large flat stones in the swiftest parts of fast-flowing streams. Here they prowl in their quest for the aquatic stages of mayflies, stoneflies and others, and here they live for three years before transformation.

Most of us have noticed a bright green,



How to use the microscope to explore the mysteries of an unseen world. 32-page booklet tells how to go about microscopy as a hobby, describes Bausch & Lomb microscope equipment for the amateur. Write for your copy. *Model R Microscope with case and 455-page book, $21.00. Other microscopes. $14.50 up.*

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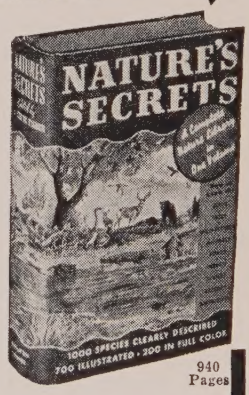

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smallish and very delicate fly-like insect on weeds and garden flowers. It is the adult stage of *Chrysopa* (golden-eye), one of the lacewing-flies, golden-eyed flies or Aphis-lions. The antennae are very long, the flight short and weak, the wings entirely membranous and very netted in venation, and the eyes large and golden. Eggs are laid in clusters, each on the top of a long slender stalk that the female spins, so that a group looks like a fairy forest of golf balls on long waving stems. These occur on the upper surface of a leaf and inspection will show that the plant is infested with aphids or plant lice, upon which the larva of *Chrysopa* feeds. These larvae are small wingless creatures, soft-bodied, dark with bright patches of red or yellow, and have a large and prominent pair of mouthparts protruding forward, similar in structure to those of the ant-lion, next to be described. All stages of this insect make attractive whole mounts, while the wing may be taken as representative for the order.

The third type to be mentioned is the famous ant-lion, *Myrmeleon,* the larva of which is called "doodle-bug" in the South, where they are more abundant than in the North. These insects construct perfectly symmetrical pitfalls in flat, sandy places, circular in outline and with sloping sides as steep as the particular sand will permit. The larva accomplishes this feat by shoveling out sand with the head and, when the trap is completed, lies buried at the vortex in the bottom center, with only the two jaws protruding. When ants or other wingless insects blunder into one of these circular pits, they are precipitated to the bottom by the landsliding sand grains and are seized by this inexorable pair of jaws. Should they succeed in climbing up the slope, the larva will throw sand grains at them, starting a fresh avalanche.

These mouthparts are exceptionally interesting as slide mounts. The pair of mandibles are large and strong, curved, tapering, and armed with formidable spines. Each has a furrow on its under side, and over this fits the equally long but much more slender maxilla, with a groove on its upper surface. The two grooves, fitting together, make up a tube, through which the blood of the victim is sucked into the mouth. The pupal stage is passed in a silk-lined cocoon of sand grains, while the adult is a large and graceful creature somewhat resembling a damselfly, but the forewings are larger than the hinder pair.

To prepare a slide of the ant-lion larva, mount either the whole insect or the mouthparts alone, as preferred, using the potashing method, as given in our November, 1938, issue.

Not all of the very large cells occurring in animal bodies are visible to the naked eye. Largeness may be a matter of great length rather than merely of bulk. Some nerve cells whose cell bodies lie beside the spinal cord send out processes or fibers that extend all the way down the leg to motivate muscles in a toe. In the giraffe, such processes leading down the front legs must occasionally, in large specimens, reach the astounding length of ten feet! Anatomists were slow in accepting the view that such a fiber was actually the product, and a part of, a single cell.

The most bizarre shapes among cells occur in the spermatozoa or sperm cells, male reproductive elements. Typically, as in man, these have rounded—streamlined—heads and a long propelling tail. Some types, however, have no tails, others more than one; some have heads in the form of very long slender bodies, corkscrews, sickles—an almost endless variety of shapes. A slide collection of these cells is most interesting.

Trade Notes

"In science, as in all other departments of human knowledge and inquiry, no thorough grasp of a subject can be gained, unless the history of its development is clearly appreciated" (Geikie). Regular readers are familiar with our intermittent series on the history of microscopy, which is being covered in sufficient detail for most purposes, but there are many who will welcome broader treatment, covering science in general.

For them we heartily recommend a new edition of a famous work, *A Short History of Science,* by Sedgwick and Tyler, now revised by Tyler and Bigelow. The immense field is concisely treated in 533 pages, with the various divisions well correlated. From a complete work of this nature one learns to place persons and events in their proper perspective and to accord true values to discoveries, inventions and movements. Here is the true history of civilization and of the slow progress of mankind through the ages. Compared with such a story, the usual schoolbook history, with its interminable wars and successions of dynasties, pales into insignificant and repetitious twaddle. Many illustrations and tables are included. The Macmillan Company, 60 Fifth Ave., New York City. $3.75.

Catalog-of-the-month will appeal to a more limited group than usual, but the appeal will compensate in greater strength for smaller numbers. Every so often we have a request for reference to a binocular microscope that is less expensive than the usual model, and more within the reach of the average purse. Those who know anything about the construction of such an instrument realize that it has to be expensive, since it is virtually two microscopes, side by side, and with the addition of costly prism mountings in the body. We are just in receipt of the number 67V Spencer Junior Stereoscopic Microscope, and catalogs for this Spencer line have been placed at the disposal of our readers. Smaller and more compact than the large laboratory models, this handsome instrument is simply marvelous for work with all those larger objects that constitute so much of the interest in microscopy—dissections, insects, flowers, fossils, minerals, engravings, textiles, soils and so on and on through a long list.

You can start as low as $88—a remarkably low figure for this class of instrument—and build up the equipment by later additions, as or if preferred. There is great depth of focus, a large field, ample working distance, and a vivid stereoscopic image. Those of our fans who own a regulation compound monocular microscope and who work with any of the classes of specialties requiring a binocular for best results and who can afford a second instrument, should at least secure a copy of this catalog and consider the possibilities. Teachers of all forms of science in both high school and college should also have a copy; and the same applies to factory workers and technicians generally. Write to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C., inclose a 3c stamp for mailing, and ask for a copy Spencer Stereoscopic Microscopes. You w enjoy this attractive and beautifully illustrat 16-page booklet.

American Society of Amateur Microscopists

President, Simon Henry Gage, Ithaca, N. Y.

Permanent Secretary, Julian D. Corrington, Chestertown, Md.

Official organ, *Nature Magazine*, Washington, D. C.

Address all communications concerning the Society to Dr. Corrington at Chestertown, Md. Application for Membership form sent on request. Dues, one year, fifty cents; two years, one dollar.

A.S.A.M. News

The group of microscope enthusiasts Bangor High School, Bangor, Pa., describ in our preceding issue, have now complet their organization as the Bangor Chapt A.S.A.M., the fourth such club to be ch tered, and the third in Pennsylvania, whi state seems far more Chapter-minded th any other.

Meanwhile plans to install Chapters forward in many other centers, includi Boston; Bronx, adults; Bronx, ages 12-1 northern New Jersey; Detroit; Indianapoli Franklin, Ind.; Minneapolis-St. Paul; Was ington, D.C.; Toronto, and Edmonton, A berta, as well as at individual high schoo and colleges in both the United States a Canada. Our new Chapter Manual, known Service Publication #1, sent free to me bers only, has proved helpful and stimulatin

A.S.A.M. Bulletin #3 includes a lar number of short articles on many phases technique, as well as longer features. Ga Weingarten continues his series on the M croscopy and Identification of Fibers, Miria Bisbee contributes a clever set of illustrat instructions for a homemade well microtom and an opportunity to purchase a famo old collection of some 5000 microscope slid is announced. Several letters from membe were sufficiently attractive and information to warrant inclusion.

Among the features is a tabular analys of the aims and specialties of the avera amateur microscopist, compiled from 3 membership cards. First choices counted thr points, second choices two, and third, o and on this basis the leading subjects we microtechnique (569), pond life in gene (560), protozoa (555), photomicrograp (530), insects (515), bacteriology (481 diatoms (449) and histology (433). As w to be expected, the biological group far e ceeded the inorganic. Second place was ca tured by the operations group, includi drawing, microprojection, the microscop microtechnique and photomicrography.

Publicity for the Society continues to gro Dr. Corrington had an article entitled "T American Society of Amateur Microscopist in the June issue of *The Science Counselo* by invitation, while Doris Gale, Brookl author, has written up the A.S.A.M. for forthcoming number of *The Young People Weekly*. Some sort of hook-up with T National Association of Biology Teachers expected shortly.